FRANKS TRACT STATE RECREATION AREA WETLANDS HABITAT RESTORATION

COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

Proposal Forms required of Moffatt & Nichol Engineers for Services/Private Contracts follow this page. DPR and DWR are not required to submit any forms at this time.

With regard to the general terms and conditions, deviation is requested for item 9 on page 35 of the RFP. Indemnification will be provided for general liability and for professional errors and omissions in a form consistent with our ability to insure those risks under our insurance coverages.

FRANKS TRACT STATE RECREATION AREA WETLANDS HABITAT RESTORATION

NONDISCRIMINATION COMPLIANCE STATEMENT

MOFFATT + NICHOL ENGINEERS
COMPANY NAME

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unle
specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code
Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and t
development, implementation and maintenance of a Nondiscrimination Program. Prospective contract
agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant f
employment because of sex, race, color, ancestry, religious creed, national origin, disability (includi
HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care lea
and denial of pregnancy disability leave.

CERTIFICATION

*I, the official named below, hereby swear that I am duly authorized to legally bind the prospecti
contractor to the above described certification. I am fully aware that this certification, executed on t
date and in the county below, is made under penalty of perjury under the laws of the State of Californ*

RICHARD B. DORNHELM
OFFICIAL'S NAME

7-24-97
DATE EXECUTED

Richard Dornhelm
PROSPECTIVE CONTRACTOR'S SIGNATURE

EXECUTED IN THE COUNTY OF: CONTRA COSTA

VICE PRESIDENT
PROSPECTIVE CONTRACTOR'S TITLE

MOFFATT + NICHOL ENGINEERS
PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Item 12

Agreement No. _____

Exhibit _____

STANDARD CLAUSES –
SMALL BUSINESS PREFERENCE AND CONTRACTOR IDENTIFICATION NUMBER

NOTICE TO ALL BIDDERS:

Section 14835, et. seq. of the California Government Code requires that a five percent preference be given to bidders who qualify as a small business. The rules and regulations of this law, including the definition of a small business for the delivery of service, are contained in Title 2, California Code of Regulations, Section 1896, et. seq. A copy of the regulations is available upon request. Questions regarding the preference approval process should be directed to the Office of Small and Minority Business at (916) 322-5060. To claim the small business preference, you must submit a copy of your certification approval letter with your bid.

Are you claiming preference as a small business?

_____ Yes* _✓_ No

*Attach a copy of your certification approval letter.

EXHIBITS

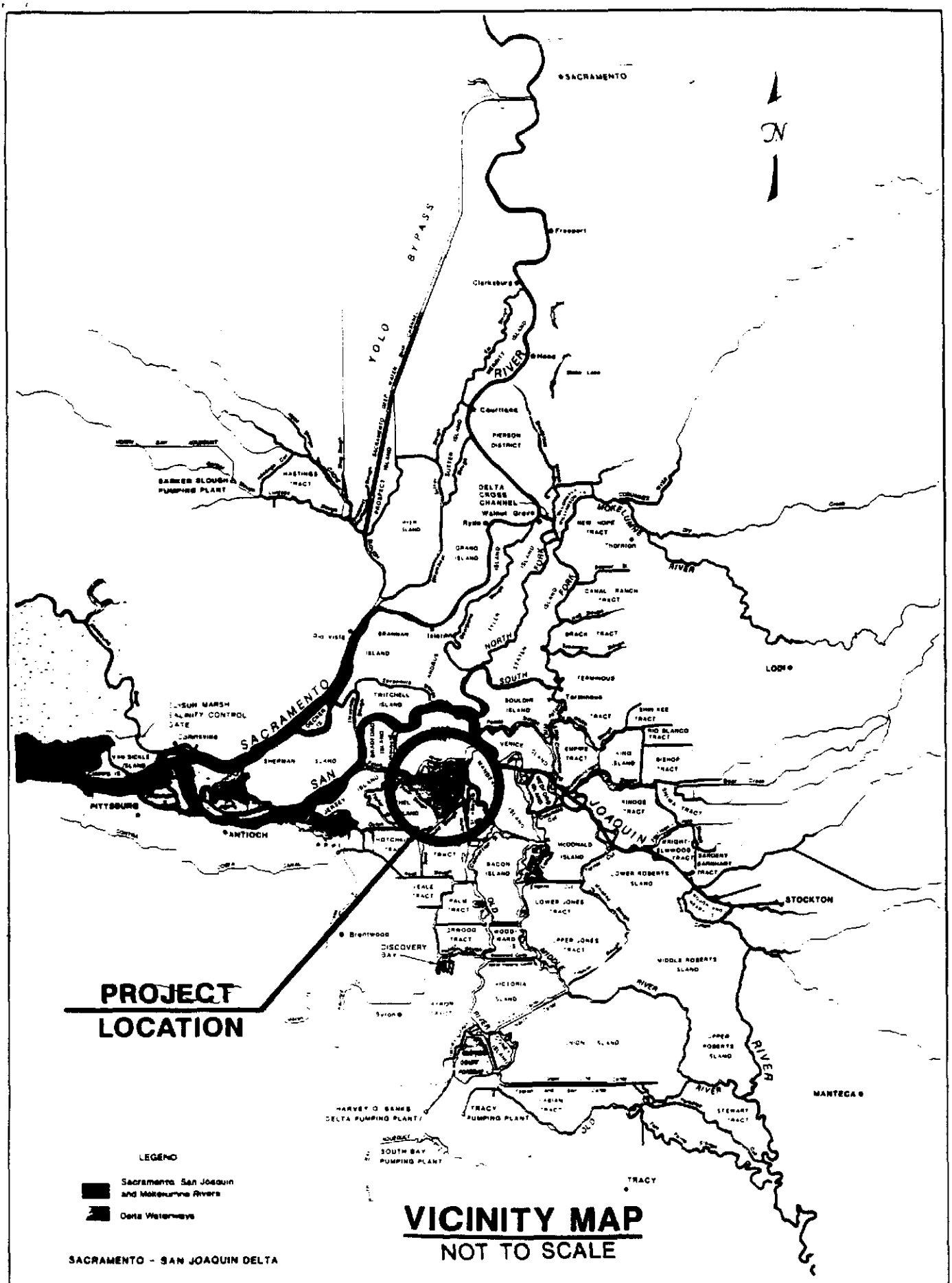
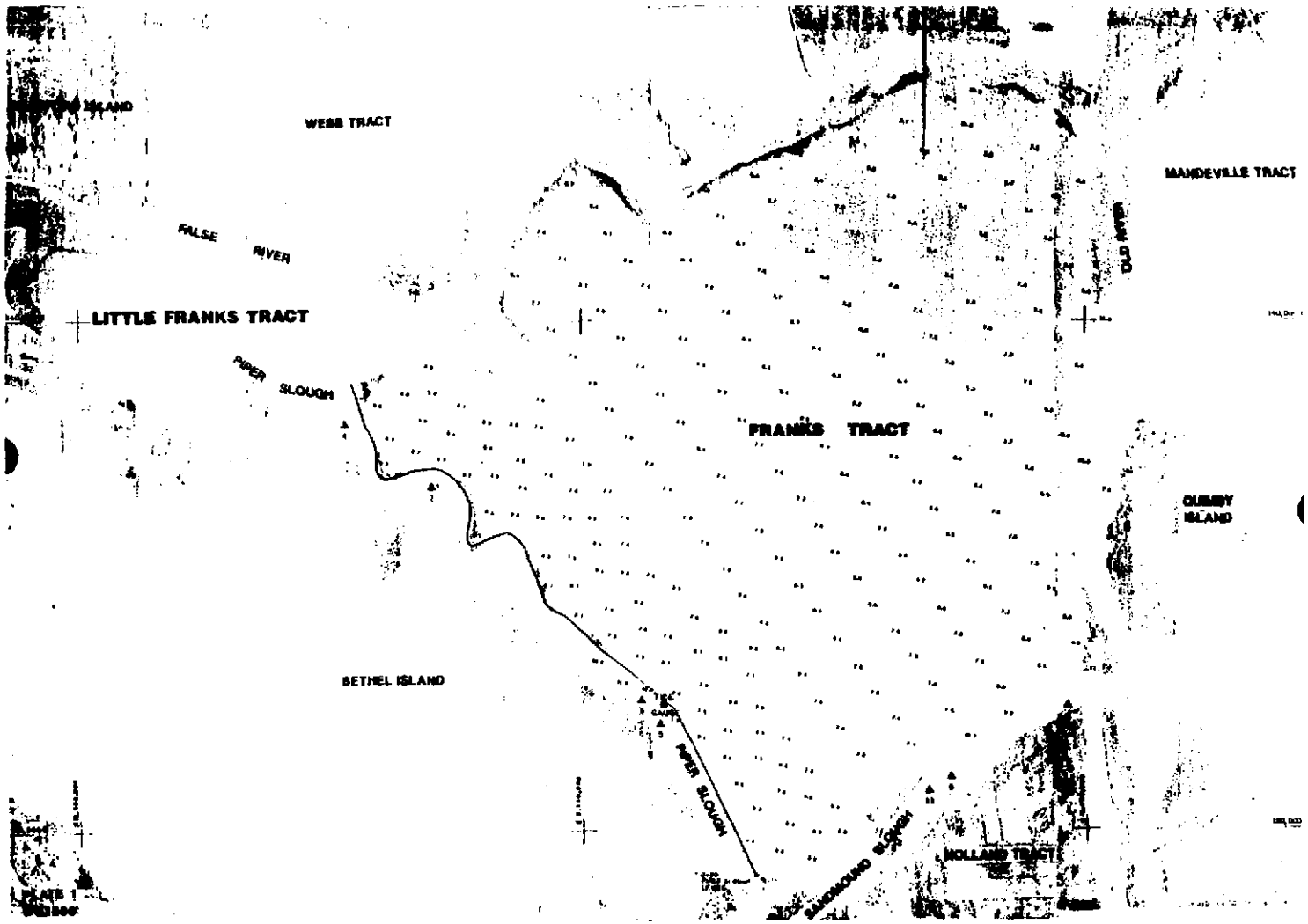


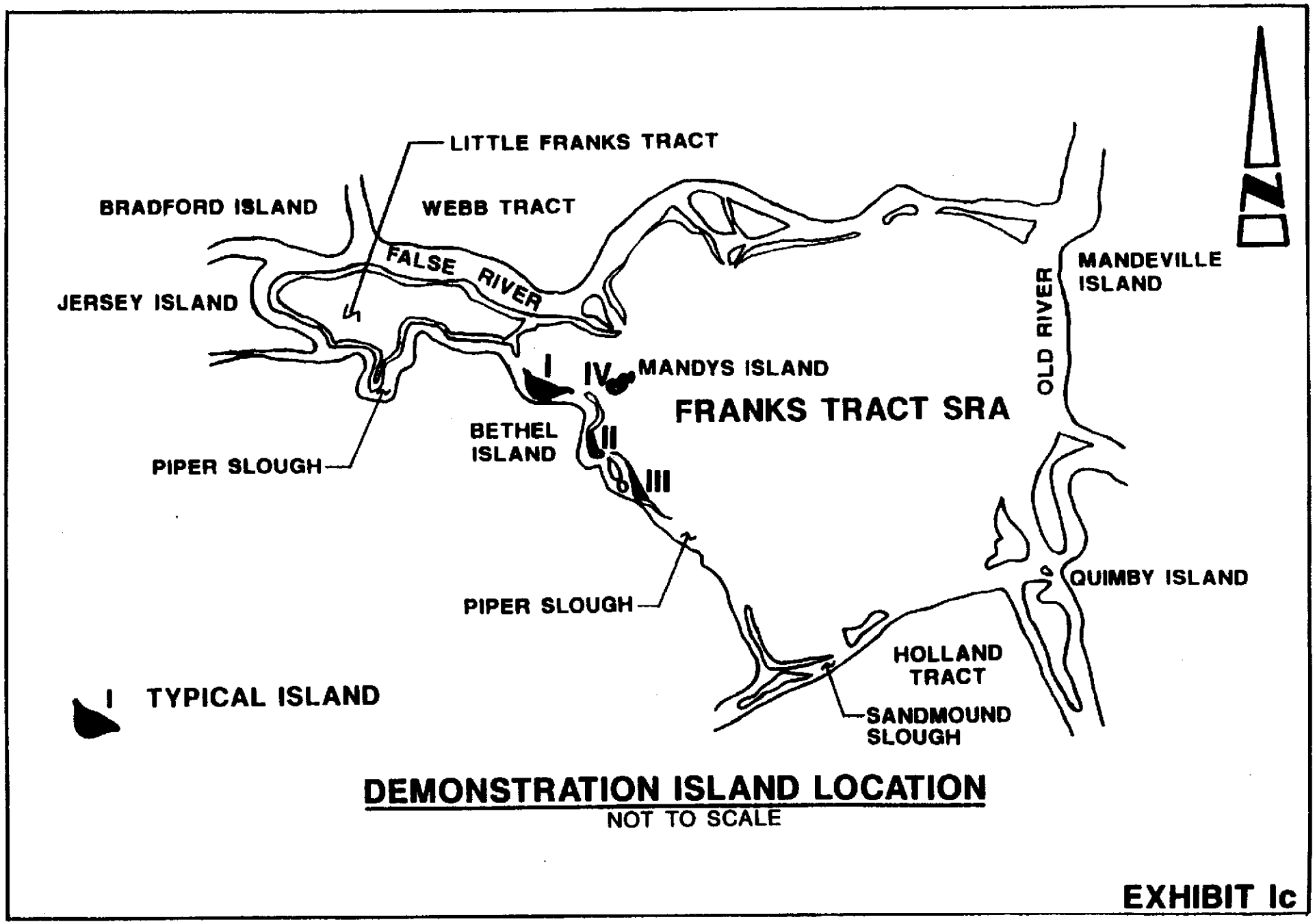
EXHIBIT 1a

Department of Water Resources



SITE PLAN
NOT TO SCALE

EXHIBIT Ib



DEMONSTRATION ISLAND LOCATION

NOT TO SCALE

EXHIBIT Ic

FRANKS TRACT WETLANDS HABITAT RESTORATION

BENEFITS FOR PRIORITY HABITATS AND SPECIES

PRIORITY HABITATS

✓	TIDAL PERENNIAL AQUATIC HABITAT (FRESHWATER)
	SEASONAL WETLAND AND AQUATIC HABITAT
	INSTREAM AQUATIC HABITAT
✓	SHADED RIVERINE AQUATIC HABITAT
	SALINE EMERGENT WETLANDS HABITAT (TIDAL)
✓	MIDCHANNEL ISLANDS AND SHOAL HABITAT
	NORTH DELTA AGRICULTURAL WETLANDS AND PERENNIAL GRASSLANDS

PRIORITY SPECIES

✓	SAN JOAQUIN AND EAST-SIDE DELTA TRIBUTARIES FALL-RUN CHINOOK SALMON
✓	WINTER-RUN CHINOOK SALMON
✓	SPRING-RUN CHINOOK SALMON
✓	LATE-FALL RUN CHINOOK SALMON
✓	DELTA SMELT
✓	LONGFIN SMELT
✓	SPLITTAIL
✓	STEELHEAD TROUT
	GREEN STURGEON
✓	SECONDARY PRIORITIES INCLUDE STRIPED BASS AND MIGRATORY BIRDS

EXHIBIT II

CALFED- FRANKS TRACT WETLANDS HABITAT RESTORATION
PROPOSED SCOPE OF WORK

PHASE	TASK	COAPPLICANT LEAD	DELIVERABLE
1-PRECONSTRUCTION	**1.00 ENVIRONMENTAL CERTIFICATION**	MNE	
	1.01 PREPARE ADMIN DRAFT I.S.	JSA*	ADMIN DRAFT-INITIAL STUDY
	1.02 PREPARE DRAFT I.S.	JSA*	DRAFT-INITIAL STUDY
	1.03 PREPARE MITIGATION PLAN	JSA*	MITIGATION PLAN
	1.04 PREPARE NEG. DEC.	JSA*	NEG. DEC.
	1.05 CERTIFY CEQA	DPR	CEQA CERTIFICATION
	1.06 OBTAIN PERMITS	DPR	PERMITS
	1.07 PREPARE MONITORING PROGRAM	JSA	MONITORING PROGRAM
	1.08 PREPARE BASIS OF DESIGN	MNE	BASIS OF DESIGN REPORT
	1.09 PREPARE PS & E, 60%	MNE	PLANS, SPEC & ESTIMATES
	1.10 PREPARE PS & E, 90%	MNE	PLANS, SPEC & ESTIMATES
	1.11 PREPARE PS & E, 100%	MNE	PLANS, SPEC & ESTIMATES
	1.12 PREPARE PS & E, FINAL	MNE	PLANS, SPEC & ESTIMATES
2- CONSTRUCTION	**2.00 CONTRACT CONSTRUCTION**	DWR	
	2.01 SOLICIT BIDS	DWR	PROGRESS REPORT
	2.02 AWARD CONTRACT	DWR	PROGRESS REPORT
	2.03 MANAGE CONSTRUCTION	DWR	PROGRESS REPORT
	2.04 CONSTRUCTION	DWR	PROGRESS REPORT
3- POST CONSTRUCTION	**3.00 MONITORING**	DPR	
	3.01 YEAR 1	DPR	ANNUAL REPORT
	3.02 YEAR 2	DPR	ANNUAL REPORT
	3.03 YEAR 3	DPR	ANNUAL REPORT

* RECOMMENDED SUBCONSULTANT

EXHIBIT III

FRANKS TRACT WETLANDS RESTORATION - BUDGET COSTS
Prepared for: CALFED
Prepared by: Moffatt & Nichol Engineers
Submitted: July 28, 1997

28-Jul-97

Phase No.	Item	Direct Labor Hours	Direct Salary and Benefits $ 120	Overhead Labor (General, Admin and fee)	Service Contracts	Material and Acquisition Contracts	Miscellaneous and other Direct Costs	Total Cost
1.00	**Preconstruction**							
1.01	Prepare Administrative Draft - Initial Study				$ 41,873			$ 41,873
1.02	Prepare Draft - Initial Study				$ 6,398			$ 6,398
1.03	Prepare Mitigation Plan				$ 1,927			$ 1,927
1.04	Prepare Negative Declaration				$ 4,620			$ 4,620
1.05	Certify CEQA	160	$ 5,436					$ 5,436
1.06	Obtain Permits	160	$ 5,436		$ 19,448			$ 24,884
1.07	Prepare Monitoring Program				$ 5,016			$ 5,016
1.08	Prepare Basis of Design	150	$ 18,000				$ 500	$ 18,500
1.09	Prepare PS&E, 60%	440	$ 52,800				$ 1,000	$ 53,800
1.10	Prepare PS&E, 90%	270	$ 32,400				$ 1,500	$ 33,900
1.11	Prepare PS&E, 100%	180	$ 21,600				$ 1,500	$ 23,100
1.12	Prepare PS&E, Final	80	$ 9,600				$ 2,500	$ 12,100
	Phase Total	1,440	$ 145,272	$ -	$ 79,281	$ -	$ 7,000	$ 231,553
2.00	**Construction**							
2.01	Solicit Bids	200	$ 6,800					$ 6,800
2.02	Award Contract	100	$ 3,400					$ 3,400
2.03	Manage Construction	3,000	$ 102,000					$ 102,000
2.04	Construction	850	$ 28,889			$ 4,127,000		$ 4,155,889
	Phase Total	4,150	$ 141,089	$ -	$ -	$ 4,127,000	$ -	$ 4,268,089
3.00	**Post Construction - Monitoring**							
3.01	Monitoring - Year 1	206	$ 7,000		$ 20,000			$ 27,000
3.02	Monitoring - Year 2	212	$ 7,200		$ 20,500			$ 27,700
3.03	Monitoring - Year 3	218	$ 7,400		$ 21,000			$ 28,400
	Phase Total	635	$ 21,600	$ -	$ 61,500	$ -	$ -	$ 83,100
	PROJECT TOTAL	6,225	$ 307,961	$ -	$ 140,781	$ 4,127,000	$ 7,000	$ 4,582,742

EXHIBIT IV

ID	Task Name	Duration
1	**1.00 PHASE PRECONSTRUCTION**	**260d**
2	1.01 PREPARE ADMINISTRATIVE DRAFT- INITIAL STUDY	12w
3	1.02 PREPARE DRAFT- INITIAL STUDY	4w
4	1.03 PREPARE MITIGATION PLAN	4w
5	1.04 PREPARE NEGATIVE DECLARATION	4w
6	1.05 CERTIFY CEQA	4w
7	1.06 OBTAIN PERMITS	24w
8	1.07 PREPARE MONITORING PROGRAM	4w
9	1.08 PREPARE BASIS OF DESIGN	8w
10	1.09 PREPARE PS & E, 60%	16w
11	1.10 PREPARE PS & E, 90%	16w
12	1.11 PREPARE PS & E, 100%	6w
13	1.12 PREPARE PS & E, FINAL	6w
14	**2.00 PHASE CONSTRUCTION**	**390d**
15	2.01 SOLICIT BIDS	6w
16	2.02 AWARD CONTRACT	4w
17	2.03 MANAGE CONSTRUCTION	68w
18	2.04 CONSTRUCTION	68w
19	**3.00 PHASE POST CONSTRUCTION- MONITORING**	**780d**
20	3.01 MONITORING- YEAR 1	52w
21	3.02 MONITORING- YEAR 2	52w
22	3.03 MONITORING- YEAR 3	52w

Project: FRANKS TRACT SCHEDULE
Date: Mon 7/28/97

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

EXHIBIT V

ATTACHMENT

F1-216

FRANKS TRACT SRA
PRELIMINARY ENGINEERING
PROJECT SUMMARY REPORT

APRIL, 1991

PREPARED FOR:

STATE OF CALIFORNIA
DEPARTMENT OF PARKS AND RECREATION
P.O. BOX 942896
SACRAMENTO, CA 94296-0001

PREPARED BY:

MOFFATT & NICHOL, ENGINEERS
3000 CITRUS CIRCLE, SUITE 230
WALNUT CREEK, CA 94598

EXECUTIVE SUMMARY

INTRODUCTION

Franks Tract State Recreation Area (SRA) is located in the Central Delta as shown on Figure ES. The SRA consists of two flooded Delta tracts, Franks Tract and Little Franks Tract, bordered by remnant levees and accessible only by boat.

A General Plan was prepared for Franks Tract SRA by the California Department of Parks and Recreation. The Plan attempts to balance the needs of recreational users with the need to protect the fragile ecosystem of the Delta. The Plan proposes, if technically feasible, an expansion of the area's land base by constructing a number of islands that would support basic recreational facilities. These man-made islands could also provide additional wetlands habitat to bolster the fish and wildlife resources of the area and in serve as effective wave barriers to help protect the levees of neighboring islands. A preliminary engineering study has just been completed to develop a practical approach to the construction of specific demonstration islands in accordance with the Plan.

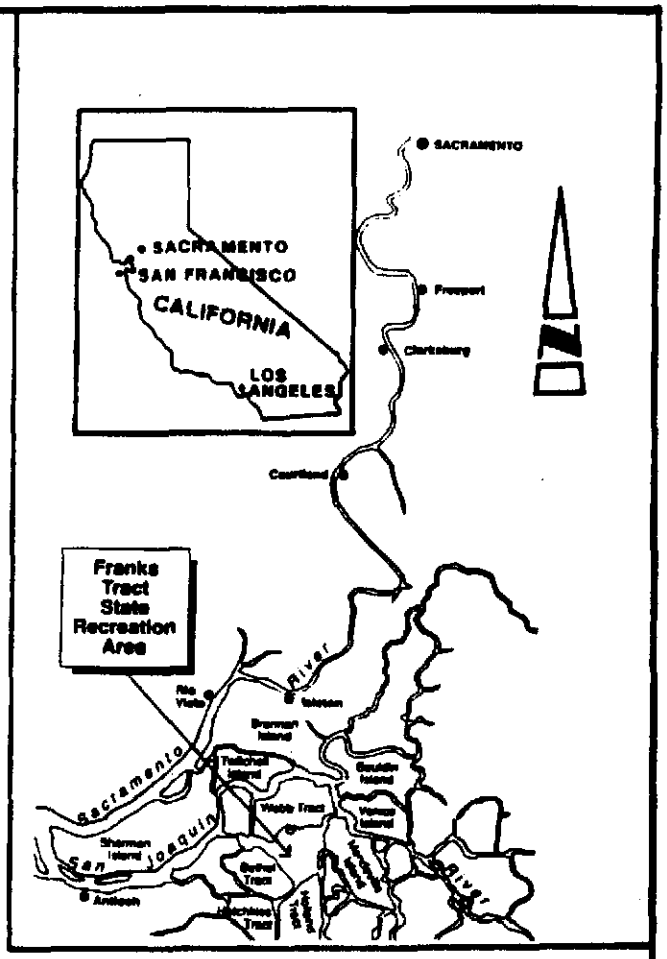
The project funding source is primarily from the Legislative Bond Act. The California Wildlife and Park Conservation Act (Prop. 70) includes up to $4 million to implement projects consistent with the Franks Tract SRA General Plan. These funds could apply to the proposed demonstration project.

The Delta Flood Protection Act (S.B. 34) provides up to $6 million annually through a Special Flood Control Projects Program to implement flood protection projects for eight western delta islands, several of which adjoin Franks Tract SRA. These funds could also apply to the demonstration project.

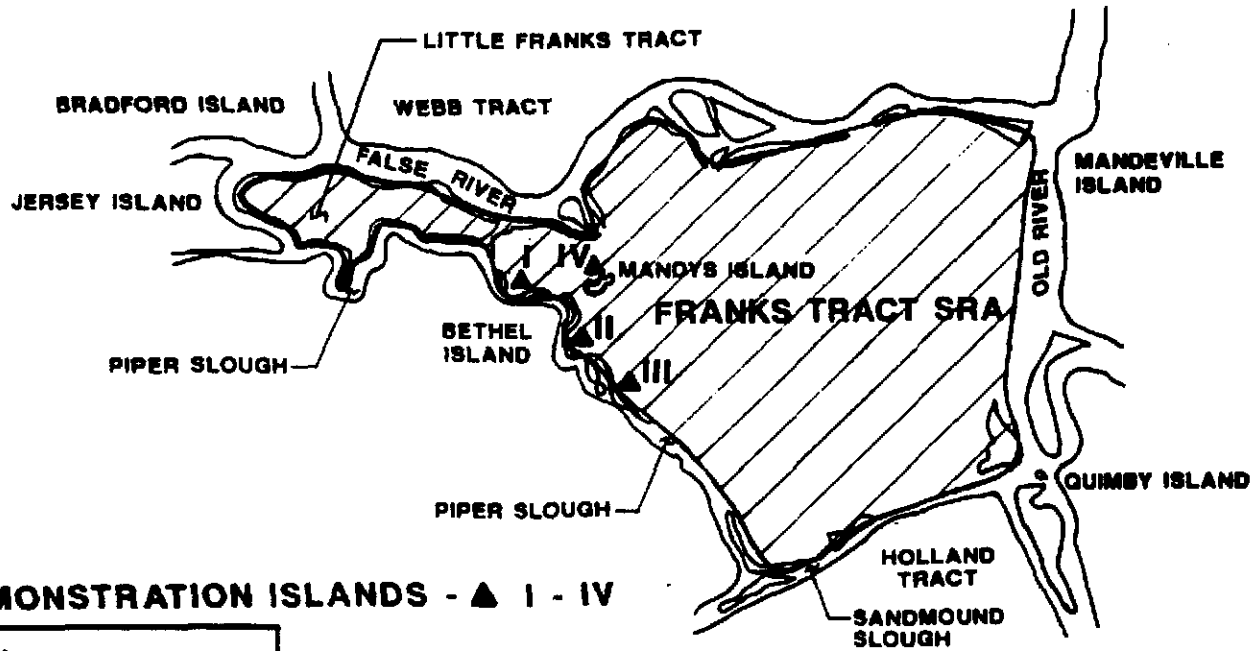
This report summarizes the recommendations of the study. Two public workshops and a Federal/State/Local interagency coordination meeting have been held to discuss the project with interested parties.

Figure ES

STATE OF CALIFORNIA
DEPARTMENT OF PARKS & RECREATION



VICINITY MAP
NTS



DEMONSTRATION ISLANDS - ▲ I - IV

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

LOCATION MAP
NTS

FIGURE-ES

PROJECT LOCATION

RECOMMENDATIONS AND SELECTION CRITERIA

This report specifically recommends construction of four demonstration "Island" fills located in the westerly portion of Franks Tract SRA for consideration as highest priority of work to be funded from the four million dollars available from the California Wildlife and Park Conservation Act (Proposition 70). Construction of a section(s) of a wall along Piper Slough is feasible and is recommended for consideration as next priority work, if additional funds or credits for mitigation enhancement become available. The following key criteria were established to measure feasibility of the alternative demonstration projects evaluated:

1. Provides recreation benefits;
2. Provides wetland habitat benefits;
3. Provides secondary wave protection for Bethel Island levees.

Additional criteria considered during the evaluation of the alternatives were:

1. Cost of project(s) proposed within available funding.
2. Engineering factors are such that the project(s) have a reasonable chance of success.
3. Environmental approval of selected project(s) obtainable in a reasonable period of time.
4. Project(s) minimize maintenance and operation costs.
5. Project(s) minimize liability and safety issues.
6. Project(s) may be eligible for wetland habitat enhancement credits under Delta Flood Protection Act (S.B. 34).

The amount of weight given to the secondary wave protection criteria for Bethel Island levees was not completely resolved during the public meetings and discussions between local Bethel Island elected officials, residents and State agencies' technical and operations staff.

Construction of a small section of demonstration walls within available funding may be appropriate to evaluate wave reduction effectiveness. This would require a reduction in island fill sizes and agreement on priority, given its main emphasis on wave protection for Bethel Island levees.

DEMONSTRATION PROJECT

The proposed demonstration project consists of four separate island fills located in the westerly portion of Franks Tract as shown on Figure ES. Islands I, II and III are placed in coves on the Franks Tract side of the Piper Slough levee. A single groin is proposed at the southerly limit of Island III to help retain the beach fill. Island IV is an enlargement of an existing partially submerged island (Mandy's Island) located nearby and between cove fill areas I and II. As summarized in Table ES, "Islands" I and II are designed specifically for wetland habitat values while "Islands" III and IV are being designed for recreation access use. "Islands" I and II provide flood (wave) protection and habitat mitigation credit as secondary benefits; "Island" III provides wetlands habitat, wave protection and habitat mitigation as secondary benefits; "Island" IV (Mandy's Island) provides secondary wetland and habitat mitigation values. The surplus wetlands benefits created by these islands should be suitable to mitigate habitat losses resulting from levee maintenance on neighboring islands, thereby facilitating levee repairs and generating indirect flood control benefits as well.

Materials for the island fills will be taken from relic sand mounds located in the central portion of Franks Tract. A total of about 1 million cubic yards of material will be removed by hydraulic dredge and placed in a series of lifts. Placement of the material will be controlled to minimize impacts on existing wetlands vegetation in the area, and on water quality. Control will also be necessary to help insure stability of the remnant levee against which the fills will be placed, and proper blending of the fill with soft organic soils for vigorous plant growth.

Vegetation should propagate naturally on the islands in the shallow water areas; seeding and planting are proposed for the riparian areas. During the period of plant establishment, passive use of the recreational beaches can be permitted. As the vegetation matures, more intensive use may be permitted, including boat-in picnicking and camping.

TABLE ES - DEMONSTRATION PROJECT SUMMARY
FRANKS TRACT STATE RECREATION AREA

	FILL SITE				
DESCRIPTION	**I**	**II**	**III**	**IV**	**TOTAL**
ESTIMATED FILL VOLUME[1] cu yds)	295,000	175,000	384,000	116,000	970,000

[1]Total includes allowance for construction losses and fill subsidence.

NET CHANGE IN AREA[2] (Acres)					
Riparian	0	0	+9.6	+1.3	+10.9
Shallow Water	+13.4	+7.7	+6.4	+6.7	+34.2
Subtidal	-13.4	-7.7	-16.0	-8.0	-45.1
BENEFITS[3]					
Recreation			P	P	
Wetlands	P	P	S	S	
Flood Protection	S	S	S		
Mitigation Credit	S	S	S	S	

The estimated cost of the proposed Demonstration Project is $3.6 million. This cost is based on 1991 construction dollars, and includes project administration and engineering fees. As a

[2]Riparian (includes Recreational Beach) is above elevation +4 ft. NGVD; Shallow Water (includes Intertidal Area) is between elevation +4 and -2 ft. NGVD; Subtidal is below elevation -2 ft. NGVD.

[3]Primary Benefits designated P, Secondary Benefits designated S; Mitigation Credit applies to levee maintenance on neighboring islands.

Demonstration Project, monitoring should be performed following construction. Monitoring will determine the extent to which the anticipated project benefits have been realized, including wetlands creation and recreational utilization.

ENVIRONMENTAL REVIEW

The proposed demonstration project is subject to environmental review under both Federal (NEPA) and State (CEQA) laws. Interested persons will have an opportunity to participate in the review of the project as it progresses through the environmental certification and permitting process.

PROJECT SCHEDULE

Implementation of the proposed demonstration project will require about 30 months. This schedule is based on a fast-track approach, where environmental certification and permit acquisition occur concurrently with final design and construction contract preparation during the first 12 months. Contract construction then follows over a period of about 18 months. This schedule does not include the monitoring phase of the project, which begins immediately following construction and continues for a period of up to 5 years.

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LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

A General Plan was prepared for Franks Tract State Recreation Area (SRA) by the California Department of Parks and Recreation in 1988. The Plan attempts to balance the needs of recreational users with the need to protect the fragile ecosystem of the Delta. If feasible, the plan proposes an expansion of the land base in Franks Tract by constructing a number of islands that would support basic recreational facilities. These man-made islands could also provide additional wetlands habitat to bolster the fish and wildlife resources of the area, and, in some cases, serve as effective wave barriers to help protect the levees of neighboring islands.

Preliminary engineering for further planning of the proposed islands included the following scope of work. The objective of this work was to refine the conceptual plan for the islands presented in the General Plan, and to develop a practical approach for constructing demonstration islands.

1. Surveys

The area of Franks Tract, including the remnants of the former levees and portions of adjacent slough (Piper Slough) were to be surveyed.

2. Geotechnical Investigations

The subsurface sediments were to be explored using both barge-mounted drilling equipment and geophysical profiling instrumentation.

3. Wind and Wave Patterns

Wind and wave conditions on Franks Tract were to be

analyzed to aid in developing islands that are both resistant to wave attack and effective in screening waves.

4. Sediment Transport

The sediment transport processes that influence the stability of the island fill material were to be analyzed for Franks Tract.

5. Non-Engineering Criteria

There are several non-engineering issues pertaining to Franks Tract improvements that were to be explored. Those issues included boating, fishing and hunting use patterns; waterfowl and fish habitat enhancement; and related resource management goals.

6. Island Fill

Potential sources of island fill material, both on and off Franks Tract, were to be identified, and methods of fill placement evaluated. Chemical testing to identify presence of potentially hazardous materials in Franks Tract sediments was to be performed.

7. Pilot Program

Configurations and locations for construction of demonstration islands were to be investigated.

8. Demonstration Structures

Construction of islands for recreation purposes may be more cost effective if combined with man-made structures. In some cases, structures alone may

accomplish the General Plan goals. Structures to help contain island fill material were to be investigated to enhance island stability.

9. Piers, Docks and Platforms

Structural systems and locations were to be evaluated for these public recreation facilities.

10. Little Franks Tract Interpretive Trail

The General Plan indicated that Little Franks Tract improvements include an interpretive trail, or channel, for small boats. Access improvements at existing levee breaks were to be analyzed.

11. Horseshoe Bend Bypass

A Horseshoe Bend Bypass Channel was to be analyzed. The bypass was to be studied for enhancing access to Little Franks Tract and protecting Bethel Island levees.

12. Permits and Programs of Others

Many public entities have expressed an interest in the proposed improvements. A listing of the agencies with jurisdiction over the project and the permits required was to be summarized, as well as the public's interest and their comments.

13. Public Workshops

Public workshops provided the public with an opportunity to participate in the planning process. Two workshops were to be held and newsletters were to be sent to keep the public informed.

14. Delta Flood Protection Act

The requirements of the Delta Flood Protection Act were to be reviewed, since the Act may provide an additional source of funding for proposed improvements in Franks Tract SRA.

II. SITE CONDITIONS

A. HYDROGRAPHIC SURVEYS

Bathymetric data from Towill, Inc. (July, 1990) are available for Franks Tract State Recreation Area. Plate 1 is a 1" = 1000' scale hydrographic survey of Franks Tract; Plates 2 through 4 are 1" = 200' scale surveys for Piper Slough and levee. Data are presented using the National Geodetic Vertical Datum (NGVD). Bottom elevations within most of Franks Tract is about -7 to -8 feet NGVD. Shallower areas near the levees are located at the southwest and northwest corners (including Mandy's Island) of Franks Tract and at a number of locations on the west side of the Tract. These locations contain scattered submerged sand mounds.

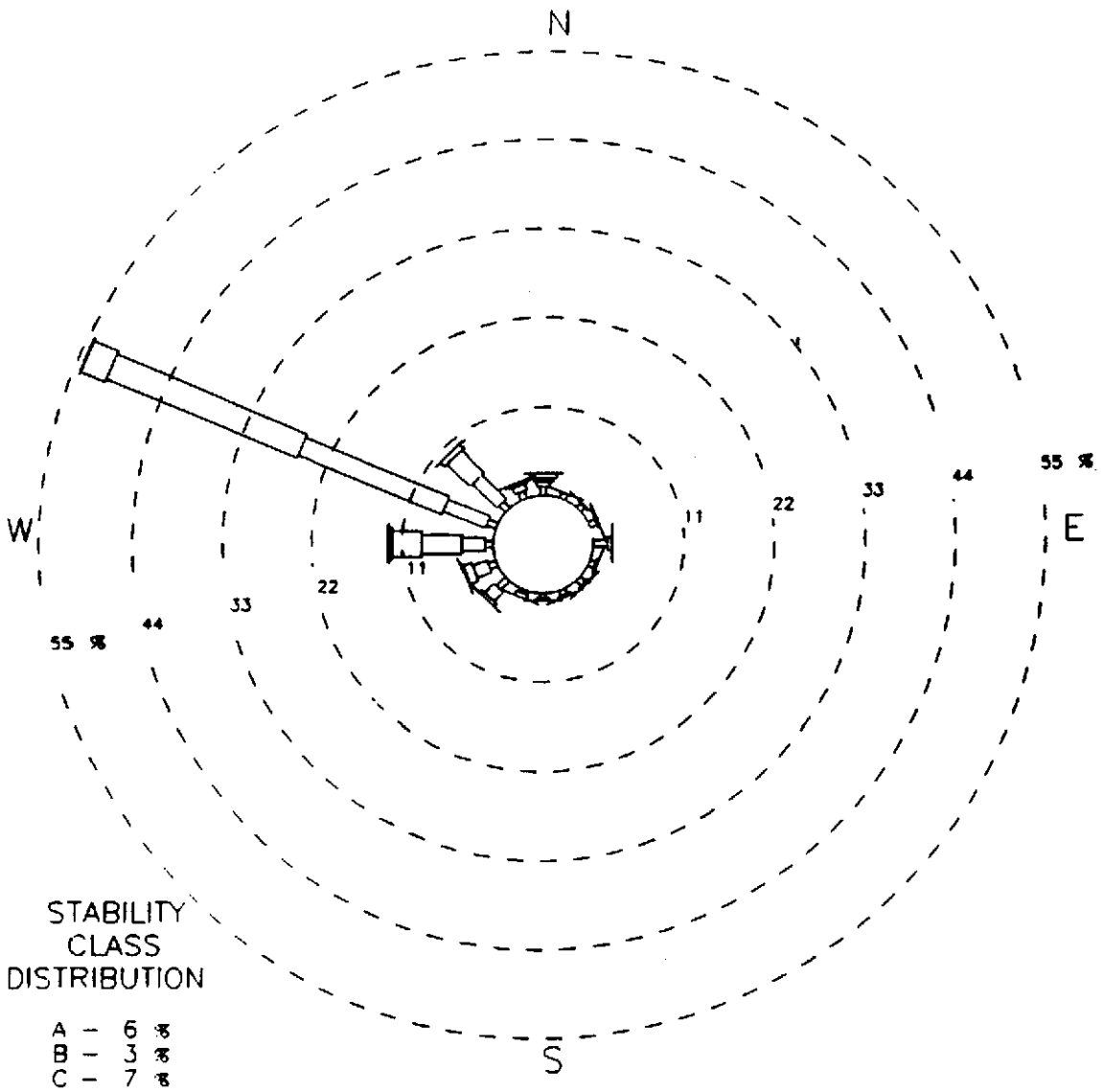
B. WIND, WATER LEVELS AND WAVE CLIMATE

1. Wind

Wind conditions at Franks Tract are best represented by data collected at Bethel Island. Quality-controlled wind data collected by the Bay Area Air Quality Management District (BAAQMD) gives a 3-year data set for prevailing wind conditions. During the spring, summer and fall, winds are out of the west through northwest directions about 70 percent of the time with an average speed of about 10 mph. During the winter, storms produce infrequent but high wind speeds from the north and southeast directions. The 1-minute average

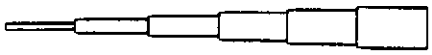
wind speed with a return period of 50 years is estimated to be 55 mph. Wind roses for summer and winter are shown on Figures 1 and 2. Detailed discussion of wind data is available in the report, "Wind and Wave Patterns," (Moffatt & Nichol, Engineers, 1990).

BETHEL ISLAND SUMMER WIND ROSE (JUN–AUG) 1989



STABILITY CLASS DISTRIBUTION

A – 6 %
B – 3 %
C – 7 %
D – 61 %
E – 10 %
F – 12 %



WIND SPEED SCALE (KNOTS)

The average wind speed is: 8.6 kts.

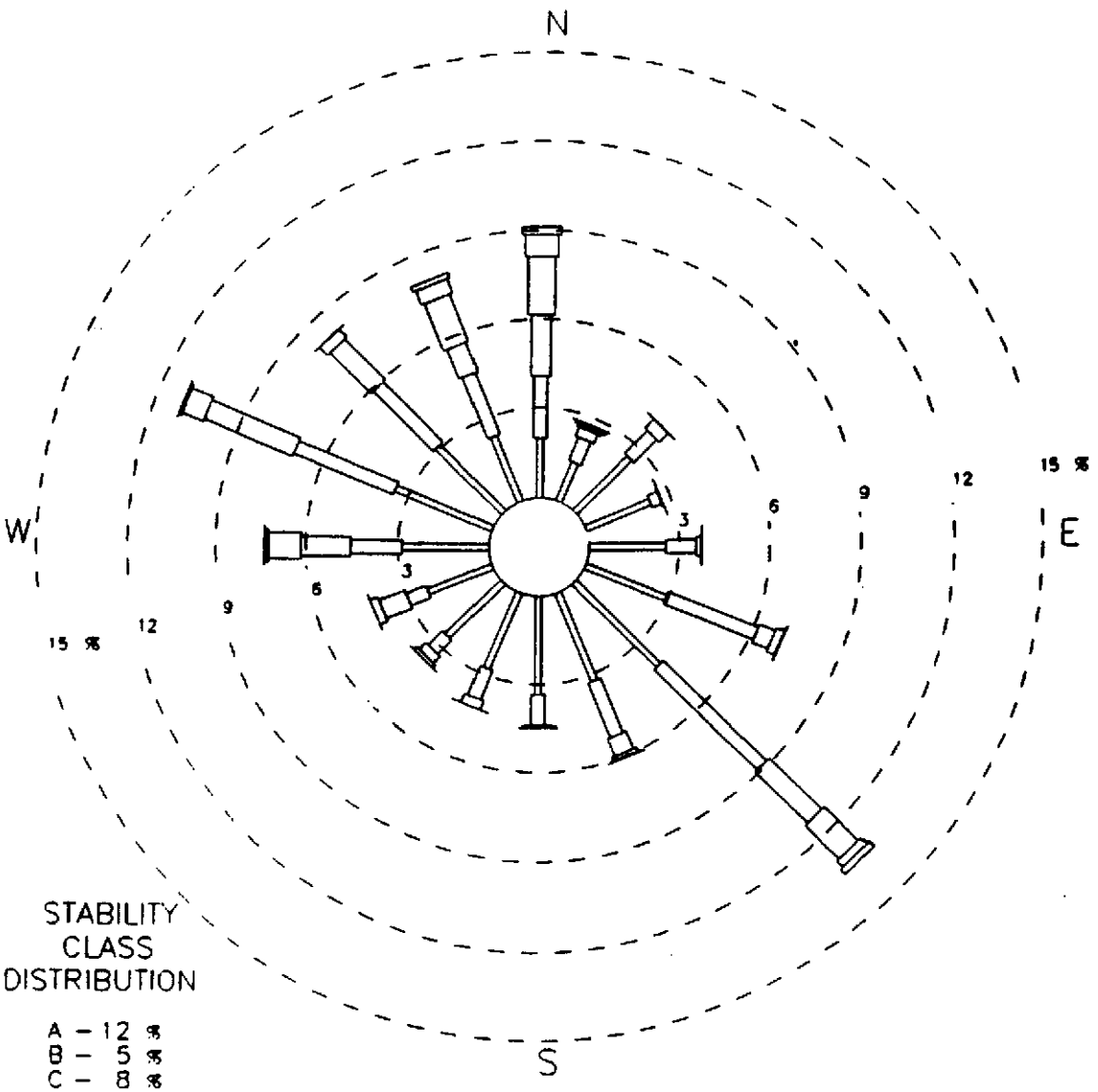
NOTE – WIND DIRECTION IS THE DIRECTION WIND IS BLOWING FROM

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
616.400 UTME
4207.400 UTMN
–1.5 m ASL
10 m AGL

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

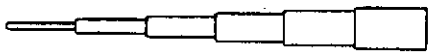
FIGURE 1

BETHEL ISLAND WINTER WIND ROSE (Dec 88–FEB 1989)



STABILITY CLASS DISTRIBUTION

A – 12 %
B – 5 %
C – 8 %
D – 36 %
E – 17 %
F – 21 %



0–3 (44 %) 4–6 (29 %) 7–10 (18 %) 11–16 (8 %) 17–21 (2 %) 22–99 (1 %)

WIND SPEED SCALE (KNOTS)

The average wind speed is: 5.4 kts.

NOTE – WIND DIRECTION IS THE DIRECTION WIND IS BLOWING FROM

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
616.400 UTME
4207.400 UTMN
–1.5 m ASL
10 m AGL

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

FIGURE 2

2. Water Levels

Water levels in the Franks Tract area are influenced by tides, winds, surface runoff and river flows. The water levels at the site are tide-dominated. Tidal datum information is presented in Table 1, based upon a Franks Tract Tidal Benchmark Sheet (NOS, 1950) and tidal benchmark sheets from nearby locations at Dutch Slough, False River, Jersey Island and Prisoner's Point, San Joaquin River (NOS, personal communication, July 1990). The reference plane is Mean Lower Low Water (MLLW) which is about 0.4 feet above the National Geodetic Vertical Datum (NGVD) reference plane.

TABLE 1

TIDAL DATUM INFORMATION

Tidal Plane	**Feet Above MLLW**
Estimated Highest Water Level	+6.5
Mean Higher High Water	+3.4
Mean High Water	+2.9
Mean Tide Level	+1.7
Mean Low Water	+0.5
Mean Lower Low Water	+0.0
Estimated Lowest Water Level	-2.0

A tide gauge was installed in Franks Tract SRA. It is located near Station 40, on the Piper Slough levee. The gauge is mounted on an existing pile and set for elevations based on NGVD.

The U.S. Army Corps of Engineers, Sacramento District has done a stage frequency analysis of the Sacramento-San Joaquin Delta area (1976). Return period water

level results, for the project site, are presented below in Table 2. The numbers are accurate to approximately 0.2 foot (Herb Hereth, Corps of Engineers, personal communication).

TABLE 2

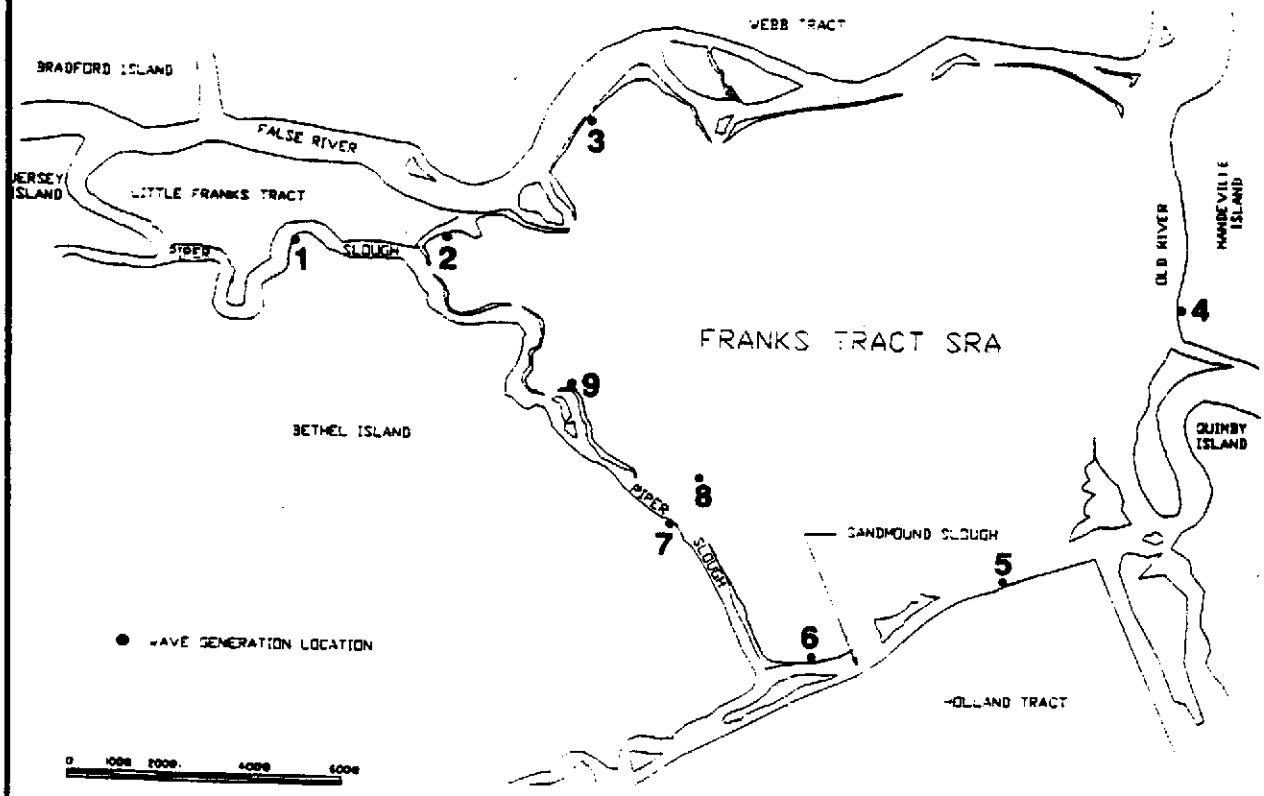
STAGE-FREQUENCY DATA

Return Period (Years)	**Water Level (Feet; NGVD)**
50	+6.7
100	+7.0

3. Wave Climate

Wind-wave generation analyses were undertaken to assess wave conditions in Franks Tract for both prevailing and extreme wind conditions. Wave conditions were calculated at a number of potential project locations around Franks Tract as shown in Figure 3. Under prevailing conditions during the spring, summer and fall, significant wave heights are about 0.5 feet at the levees along Sandmound Slough and Old River.

Wind-wave generation analysis for extreme wind conditions was based upon the 50-year return period wind event and a Still Water Level of +7.0 feet NGVD. Wind direction is defined as the direction the wind is coming from; H_s is the significant wave height, maximum wave height would be about 65 percent greater than H_s; T_p is the peak wave period. Results are presented in Table 3 for the 9 locations shown in Figure 3. Further discussion of wave conditions can be found in the report "Wind and Wave Patterns" (Moffatt & Nichol, Engineers, 1990).



HINDCAST WAVE GENERATION LOCATIONS

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

FIGURE 3

TABLE 3

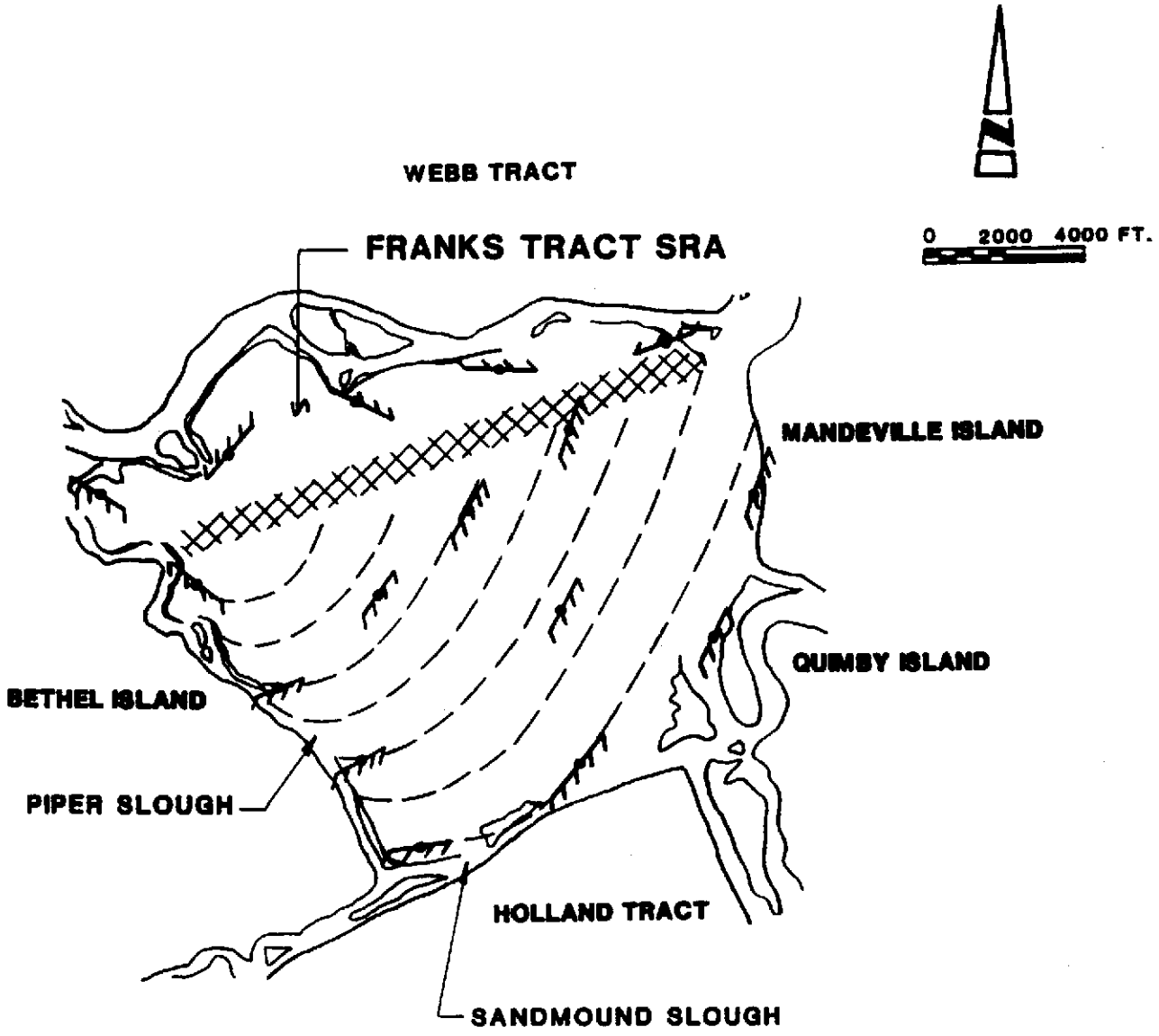
EXTREME WAVE CONDITIONS

Location	Wind Direction	H_s(ft)	T_p(sec)
1	N	1.8	2.0
	NW	2.2	2.3
2	SE	2.7	2.9
3	SE	3.0	2.9
4	NW	2.2	2.6
5	N	2.9	2.9
	NW	2.9	2.9
6	N	3.0	2.9
7	N	2.7	2.6
	NE	3.0	2.9
8	NW	2.4	2.6
	SE	2.1	2.3
9	N	1.7	2.0
	SE	2.3	2.6

C. SEDIMENT TRANSPORT

Potential longshore sediment transport varies greatly depending on location within Franks Tract. Controls on longshore, or shore-parallel, transport include exposure to the various directions of wave approach and shoreline orientation. The potential annual net longshore sediment transport rate, Q_n, is the difference between the quantity of sand that would move left and right past a shore-normal line in a year's time. The prime shoreline is the imaginary shoreline that would be exposed to the most wave energy, but oriented so that $Q_n = 0$. In most locations within Franks Tract (except the northwest) the prime zero-net shoreline orientation is north-northeast, or normal to the predominant direction of wave approach (See Figure 4). The gross longshore transport rate, Q_g, is the quantity of sand that will move past a shore-normal line in a year's time. Transport to the left and right are both considered, and are additive. The potential annual gross longshore transport

rate, Q_g, increases 30-fold from northwest to southeast within Franks Tract along



KEY

HATCHED LINES: PRIME ZERO-NET TRANSPORT SHORELINE AT STATIONS

DASHED LINES : INTERPOLATED ZERO-NET TRANSPORT SHORELINE ORIENTATIONS

: REGION OF SHIFT IN ZERO-NET TRANSPORT SHORELINE FROM SE-FACING (UPPER) TO NW-FACING (LOWER)

SHORE ORIENTATION

SHORE SIDE

PRIME SHORELINE ORIENTATIONS FOR FRANKS TRACT

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

FIGURE 4

the prime shoreline or respectively, from 750 yd^3/yr to 22,500 yd^3/yr (See Figure 5).

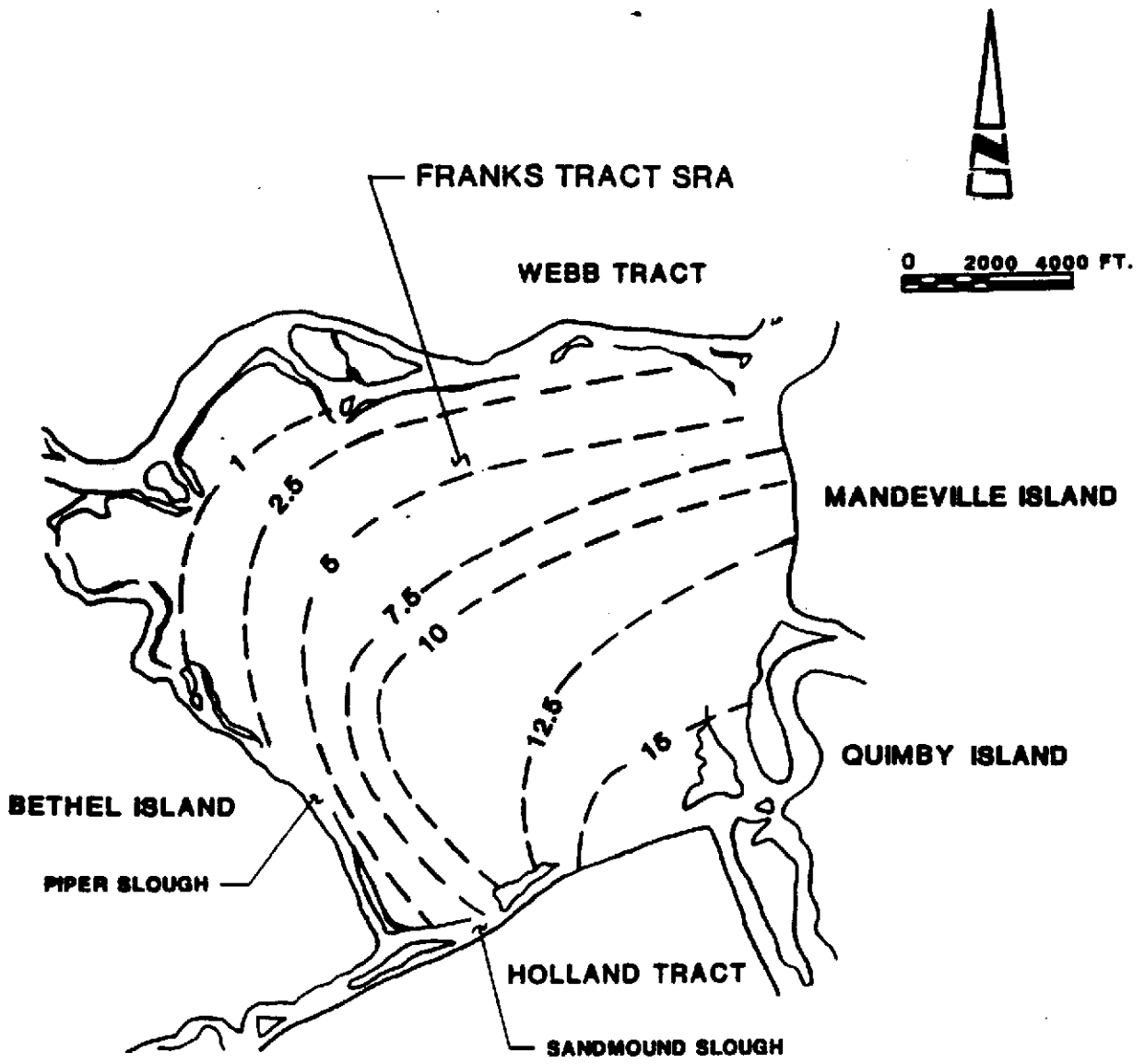
Net and gross potential transport rates also vary greatly along the levee perimeter of Franks Tract. Net transport along the west (Piper Slough) and the north perimeter is 10 to 20 percent of the net transport along the east (Old River) and south (Sandmound Slough) sides of the tract (See Figure 6).

The beach and shoreface slope is a critical parameter because the volume of sediment needed to build a beach or island is dependent upon the dynamic equilibrium slope that will result from cross-shore, wave-induced transport after construction. Beaches above mean water level will have slopes that average about 1v to 8h. Below mean water level, slopes will average about 1v to 45h. The submerged construction profile should be steeper than this to allow for a small amount of offshore transport during equilibration. Onshore transport may not occur on a milder construction profile.

Sandy beaches will be subject to aeolian, or wind-induced, erosion when a critical wind velocity of about 13 mph is exceeded. This will occur a maximum 20 percent of the time for beaches exposed to winds approaching from west to north. Narrow south and east-facing beaches will be shielded from most erosive winds. Surface creep and saltation, the predominant modes of transport, will increase to a maximum on a dry surface width of 200 feet or wider. For a wide beach, the estimated maximum annual discharge rate for a nearly horizontal, smooth, dry, unvegetated surface will be 8 to 9 yd^3/ft-yr. Wind-induced erosion and transport on a narrower beach that is wet some of the time will be significantly less. Trapping by tall, closely-spaced

obstructions such as tule stalks, and encroachment in depressions such as the lee side of a ridge, can be used to reduce or eliminate wind-borne sand discharge.

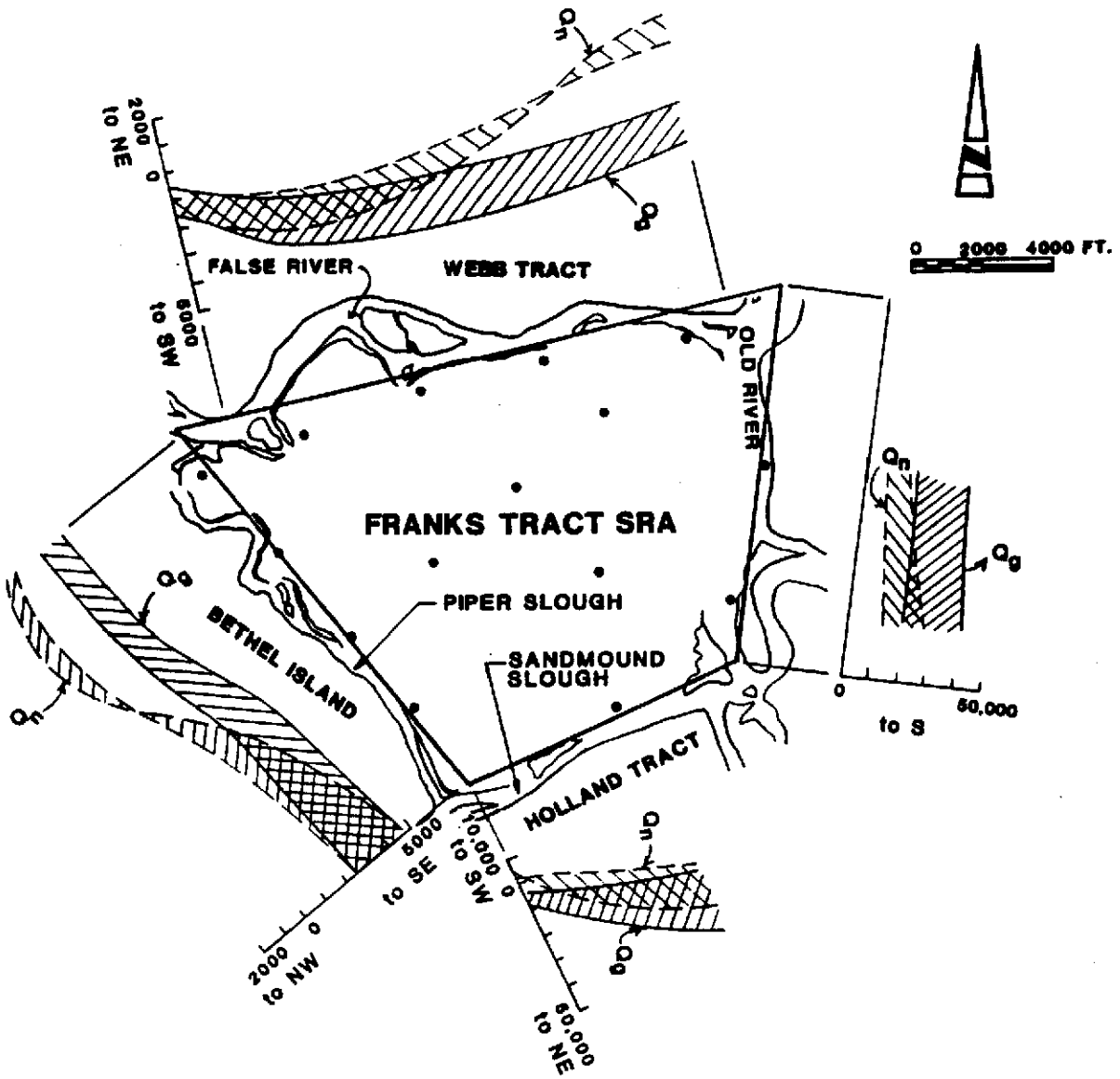
Figure 5



RELATIVE Qg VALUES FOR PRIME ZERO-NET TRANSPORT SHORE ORIENTATIONS IN FRANKS TRACT

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

FIGURE 5



ESTIMATED RANGE OF Q_n AND Q_g ALONG PERIMETER OF FRANKS TRACT

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

FIGURE 6

Further discussions on sediment transport in Franks Tract can be found in the report "Sediment Transport Analysis" (Moffatt & Nichol, Engineers, 1990).

D. GEOTECHNICAL

Geotechnical investigation was conducted by Harding Lawson Associates for Franks Tract SRA. Borings were taken at 18 locations within Franks Tract; Figure 7 shows the approximate locations. Typically, the subsurface soils include soft organic silt and fibrous peat soils underlain by a dense, fine, silty sand unit. A profile along Piper Slough levee is shown in Figure 8.

The peat layer thicknesses varies up to 25 feet in Franks Tract SRA.
In the south and west parts of Franks Tract, the peat and organic silt are generally less than 15 feet in thickness. The peat deposits become thicker on the northwestern part of Franks Tract.

Review of aerial photographs taken prior to flooding of the tract revealed that remnant sand dune deposits existed at various locations in the southwestern portion of Franks Tract. Four borings were sited to evaluate the consistency and variability of these deposits. Silty sands were encountered at each of these locations, confirming the presence of sand dunes.

The fibrous peat deposits are very soft and weak. The average total unit weight is approximately 65 pounds per cubic foot (pcf). The submerged peat therefore applies a very low effective stress on the soils below.

The silty sand unit underlying the peat was medium dense to

very dense, except for the top few feet of sand underlying the peat, which was generally loose. This loose sand was essentially unconfined because of the very low effective stress imposed by the submerged peat above. With increasing depth, the sand becomes dense. Detailed discussion of the

Figure 7

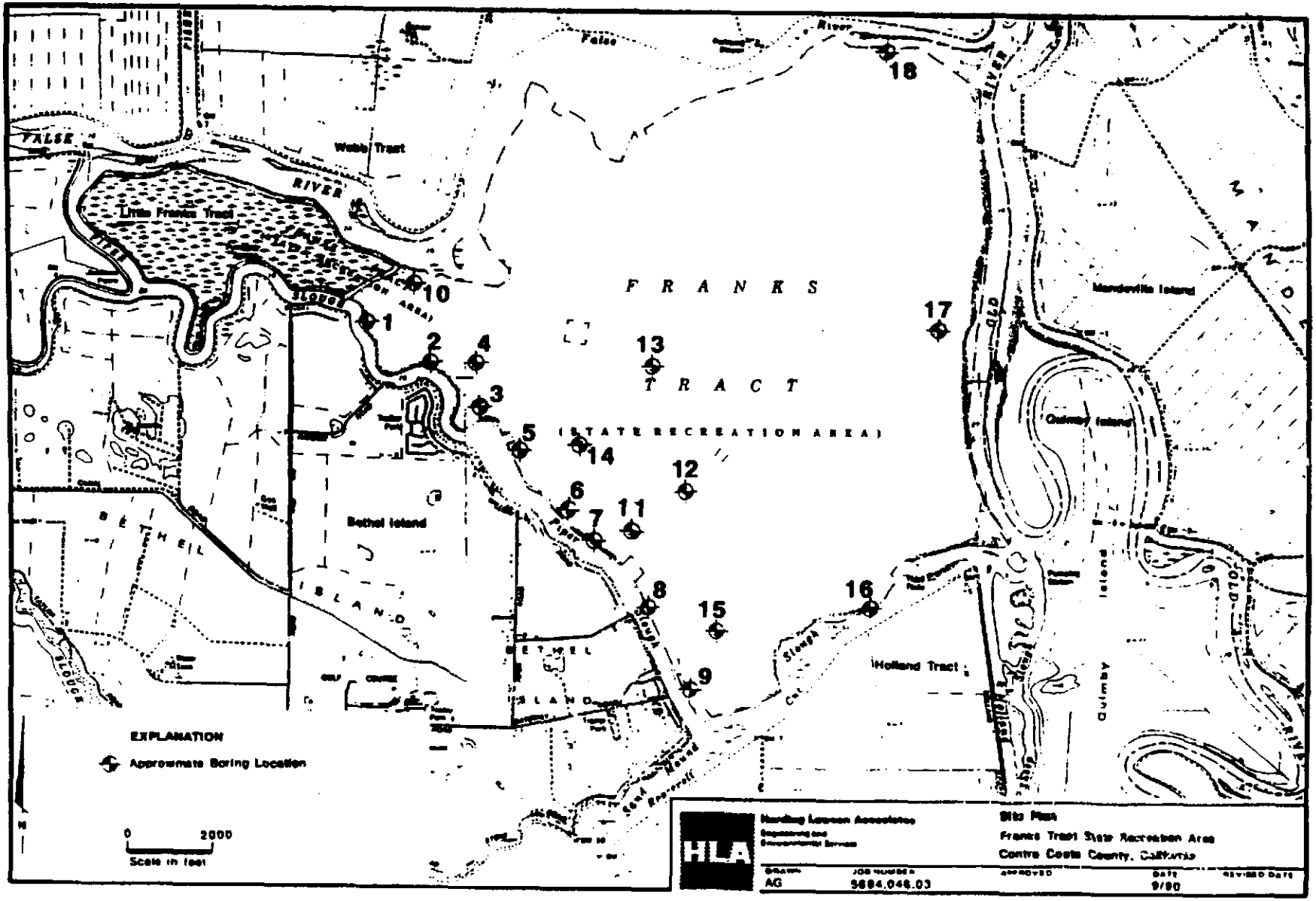
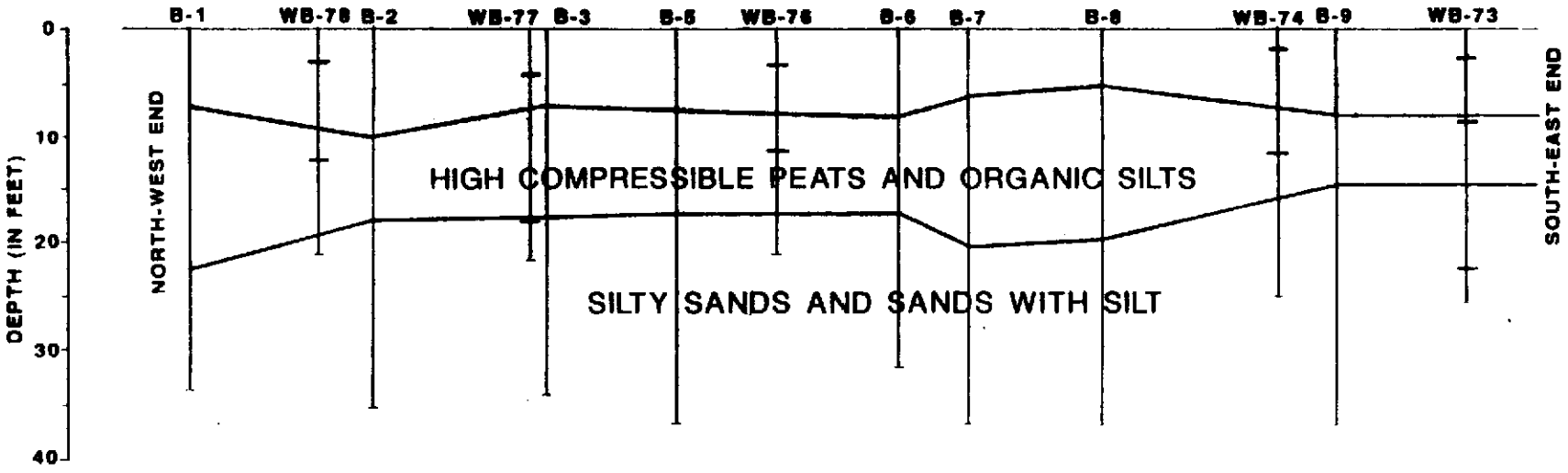
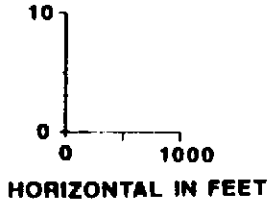

FRANKS
TRACT
(STATE RECREATION AREA)
FALSE
RIVER
Webb Tract
Little Franks Tract
Bethel Island
Holland Tract
Mandeville Island
Quimby Island
EXPLANATION
Approximate Boring Location
0
2000
Scale in feet
HLA
Harding Lawson Associates
Site Plan
Franks Tract State Recreation Area
Contra Costa County, California
AG
9/90

FIGURE 7



B-1 BORING BY HARDING LAWSON ASSOC. (1990)

WB-78 BORING BY DWR (1958)



Harding Lawson Associates

Profile Along
Piper Slough

FIGURE 8

subsurface soil conditions can be found in the report, "Geotechnical Investigation," (Harding Lawson Associates, 1990).

Sediment chemical analyses were completed on four surface soil samples. The samples were taken at the corresponding soil boring locations shown in Figure 7. The sediment analyses did not indicate high levels of materials that would be considered hazardous. Testing for the metals was compared to threshold limits described in the California Administrative Code, Title 22. Results indicated that all samples were well below the Total Threshold Limit Concentration (TTLC) for the metals tested. However, the samples contain some metals that are above the Soluble Threshold Limit Concentration (STLC), which may be of concern. Below is a summary of each sample with the metals that were above the STLC. Concentrations that are less than 10 percent above the STLC are indicated with an asterisk.

TABLE 5

SUMMARY OF TESTING FOR METALS

Sample	Metals Above STLC
B-5	Mercury, Selenium
B-7	Arsenic, Barium*, Mercury, Nickel, Lead, Selenium, Thallium, Vanadium
B-12	Mercury, Lead, Selenium, Thallium
B-18	Arsenic, Mercury, Nickel, Lead, Selenium, Thallium

Further analyses of the samples using a solubility detection

method may be necessary. The standard Title 22 method, using weak acid designed for landfill applications, may not apply. The requirements for any further testing should be developed in consultation with the resource agencies responsible for management of potentially hazardous materials.

E. NON-ENGINEERING CRITERIA

Franks Tract SRA and surrounding waterways provide for a range of boating activities including waterskiing, fishing and waterfowl hunting. The False and Old Rivers are relatively heavily travelled waterways used by boaters going towards the islands south of Franks Tract. Piper Slough experiences congested traffic due to the many marinas along the Slough. The Piper Slough/Sandmound Slough Confluence is a favored waterskiing spot. Recreational boaters and waterfowl hunters use the open waters of Franks Tract, however, usage is restricted due to choppy wave conditions and navigation hazards.

Fishing areas at Franks Tract SRA are at the southern end of the tract and also the northwest area of the tract, near the openings in the levee between Franks Tract and False River.

In the Master Plan for Franks Tract State Recreation Area, a key goal is the restoration and protection of the wildlife habitat resources. In the Sacramento-San Joaquin River Delta an important habitat that is almost completely absent is the shallow water-intertidal ecosystem. This type of habitat was largely lost when the Delta islands were leveled and drained. Practically all of Franks Tract and Little Franks Tract is in the subtidal zone and is too deeply flooded to provide this type of habitat. Thus, the proposed construction of low islands in the subtidal area has the

potential for the recreation of the shallow water-intertidal habitat that is in very short supply. The construction of these islands would be compatible with the other major goal, providing additional recreational opportunities. A detailed discussion of the wildlife habitat resources, and the recreational, fishing and hunting activities that take place in Franks Tract SRA is presented in the report, "Franks Tract - Non-Engineering Criteria," (Wendell Miller and Moffatt & Nichol, Engineers, 1990).

III. DESIGN CRITERIA

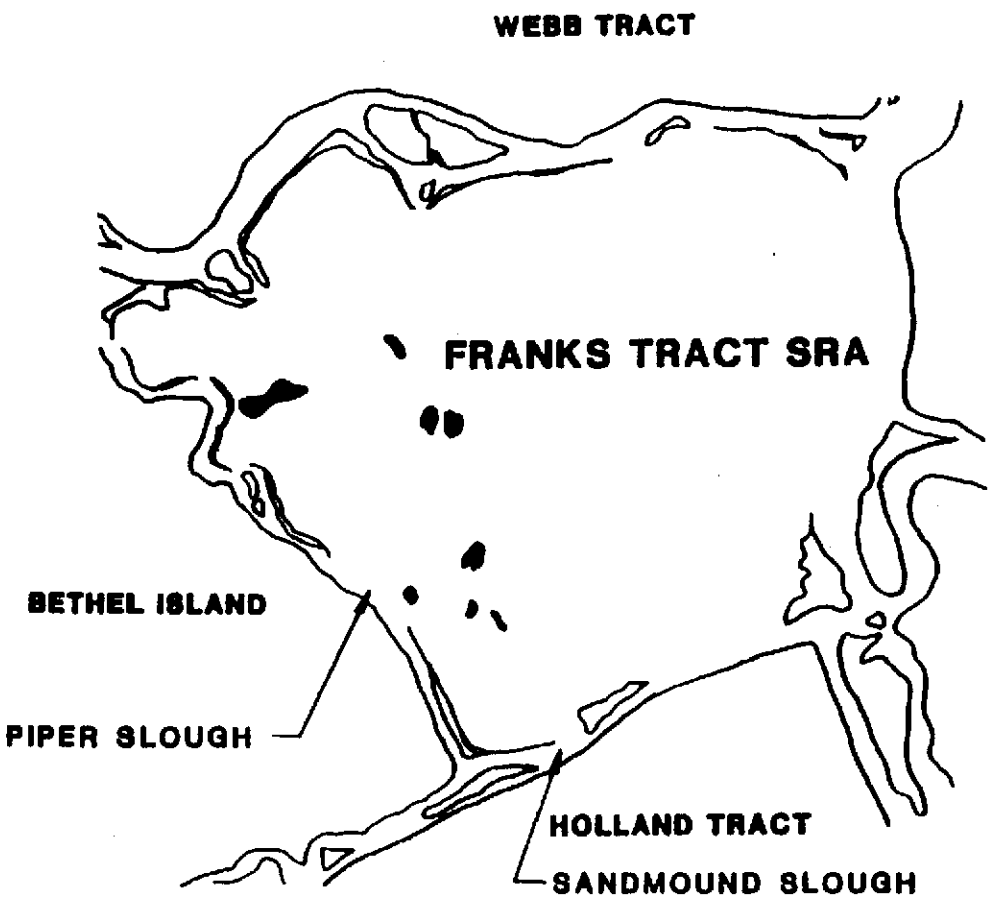
A. ISLAND MATERIAL SOURCES

Relic sand mounds in Franks Tract are ideal sources of fill for island construction. Figure 9 shows areas where surficial sand deposits were found. The sand typically has a mean size of 0.22 mm and a slit/clay content varying from 4% to 20%. In general, however, the sand unit is overlain by soft organic soils, which complicates the removal of the sand. This overburden must be stripped and disposed of. The weak soils are unsuitable for island construction except as a soil amendment in relatively small amounts to stimulate plant growth. Furthermore, the removal of the relatively impermeable soft soils could increase seepage into the sand unit, with a resulting increase in seepage on adjacent islands.

The report by Harding Lawson Associates (1990) discusses the impacts of increased seepage. These impacts can be minimized by placing new borrow areas at significant distances from neighboring islands or tracts, thereby increasing the head loss for waters entering the sand aquifer at the borrow areas. Borrow areas should be located at least 400 feet from the toe of existing or planned islands or remnant levees. Additionally, borrow areas should be located at least 2,000 feet from the nearest flood protection levee for an adjacent island or tract. Therefore, the removal of sand in Piper Slough near Sandmound Slough was not evaluated.

An investigation of potential off-site sources of fill for island construction identified several possible sites. However, the cost of such fill after paying royalties to site owners, loading it on barges and transporting it to

Franks Tract is significantly greater than the cost of on-site material.



SAND DUNE AREAS INTERPRETED FROM 1937 AERIAL PHOTOS

REF: HARDING LAWSON ASSOC., 1990

LOCATIONS WHERE SAND IS ON OR NEAR SURFACE

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

FIGURE 9

B. ISLAND MATERIAL PLACEMENT

The soft peat and organic silt found within much of the submerged area of Franks Tract are highly compressible materials that consolidate under applied loads. Initial settlements are high relative to other soils and subsequent settlements are of moderate term duration. Time rates of settlement for thicknesses of compressible peat deposits are shown in Figure 10. Additional fill material is needed to achieve the design elevation due to the consolidation of the peat material.

Fill material should be placed in stages or lifts. The report by Harding Lawson Associates (1990) recommends lifts of no more than 6 feet below the low water level and 3 feet of height above the water. Sufficient time should be allowed between lifts for the underlying peat to consolidate or gain strength. It is estimated that adequate strength gain can occur within three months at which time the next load increment can be placed. Consolidation also results in island subsidence, which can approach 1/2 the initial thickness of the soft soil unit, and substantially increase the total volume of fill required to maintain design grades. The fill must be replenished with additional lifts to compensate for subsidence.

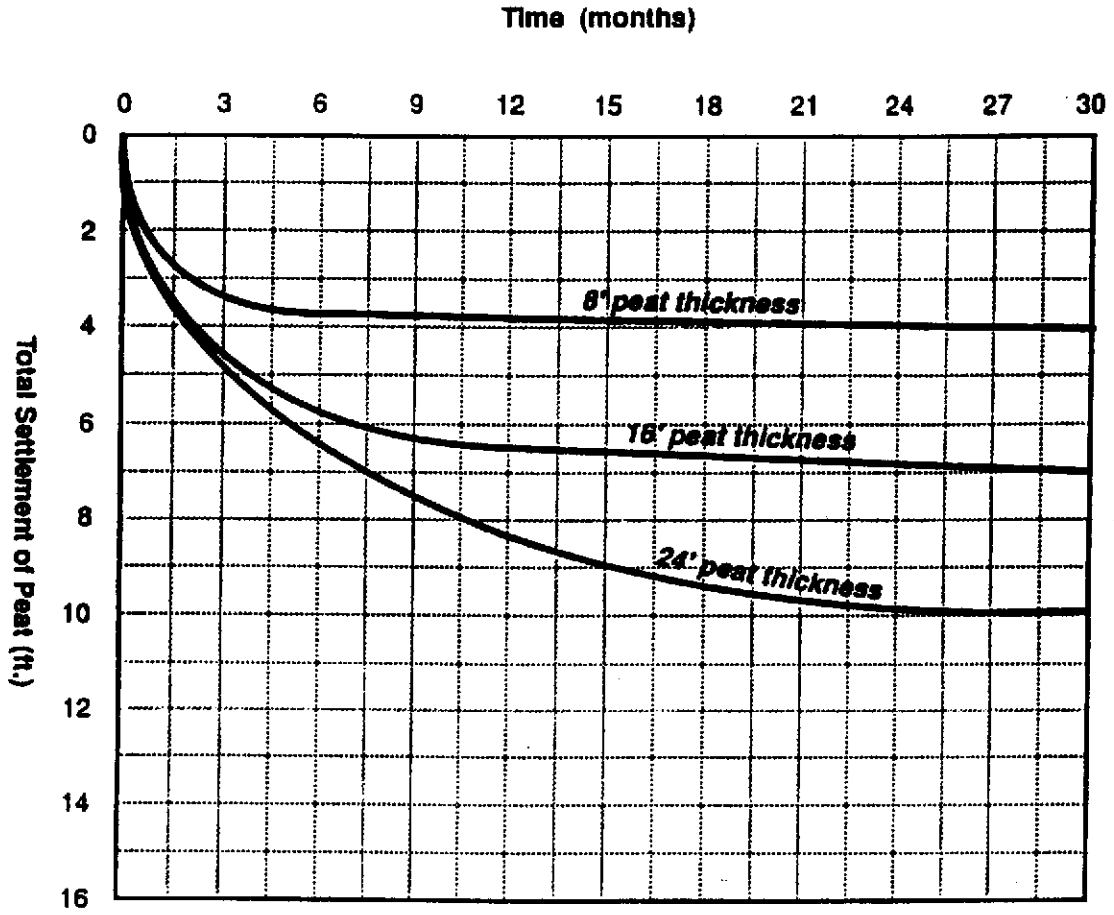
If island fills are placed directly on the sand unit, none of the above concerns arise. Areas where the sand unit lies at the surface are ideal sites for island construction, but they are also the best sites from which to obtain sand fill.

C. MAN-MADE STRUCTURES

Construction and maintenance of man-made islands may be

facilitated if structures are employed to enhance the stability of the island fill material. Many structures were evaluated for applicability at Franks Tract SRA. A detailed review is available in the report "Structures Demonstration Project," (Moffatt & Nichol, Engineers, 1990).

Figure 10



NOTES:
1. Assumed Cv of 80 ft^2/yr.
2. Settlements correspond to a sustained load of 1600 psf.

Cv = COEFFICIENT OF CONSOLIDATION

Harding Lawson Associates
Engineering and Environmental Services

Time Rate of Settlement
Franks Tract State Recreation Area
Contra Costa County, California

FIGURE 10

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RHC	5684,047.03		12/90	

Fixed structures, or groins, can be designed to retain a beach fill placed on the Franks Tract side of the levees and reduce fill loss due to longshore transport. Important design considerations for groins include their height, length and the littoral transport rate. Groins should extend out to the limit of longshore transport zone in order to minimize losses around the structure. Height of the groin will determine how much sand will pass over the structure. The groin may be constructed of treated timber, prestressed concrete, or steel sheet piles for economy of construction on the weak foundation soils that exist in the area. Alternatively the groin may be constructed as a rubble mound using quarry stone.

IV. RECOMMENDED DEMONSTRATION PROJECT

A. RECOMMENDATIONS AND SELECTION CRITERIA

This report specifically recommends construction of four demonstration "Island" fills located in the westerly portion of Franks Tract SRA for consideration as highest priority of work to be funded from the four million dollars available from the California Wildlife and Park Conservation Act (Proposition 70). Construction of a section(s) of a wall along Piper Slough is feasible and is recommended for consideration as next priority work if additional funds or credits for mitigation enhancement become available. The following key criteria were established to measure feasibility of the alternative demonstration projects evaluated:

1. Provides recreation benefits
2. Provides wetland habitat benefits
3. Provides secondary wave protection for Bethel Island levees.

Additional criteria considered during the evaluation of the alternatives were:

1. Cost of project(s) proposed within available funding
2. Engineering factors are such that the project(s) have a reasonable chance of success.
3. Environmental approval of selected project(s) obtainable in a reasonable period of time.
4. Project(s) minimize maintenance and operation costs
5. Project(s) minimize liability and safety issues
6. Project(s) may be eligible for wetland habitat

enhancement credits under Delta Flood Protection Act (S.B. 34).

The amount of weight given to the secondary wave protection criteria for Bethel Island levees was not completely resolved during the public meetings and discussions between local Bethel Island residents and State Agencies technical and Operations staff.

Construction of a small section of demonstration walls within available funding may be appropriate to evaluate wave reduction effectiveness. This would require a reduction in island fill sizes and agreement on priority given its main emphasis on wave protection for Bethel Island levees.

B. PROJECT DESCRIPTION

The proposed demonstration project consists of four separate island fills located in the westerly portion of Franks Tract as shown on Figure 11. Islands I, II and III are placed in coves on the Franks Tract side of the Piper Slough levee. A single groin is proposed at the southerly limit of Island III to help retain the beach fill. Island IV is placed in the area south of Mandy's Island. Figures 12, 13 and 14 show the plan of each island project.

Design of Islands I and II maximizes the conversion of subtidal areas to shallow water habitat areas. A typical cross-section is shown in Figure 15. The crest, or top, elevation is at +4' NGVD to maximize the area developed within the limits for shallow water habitat.

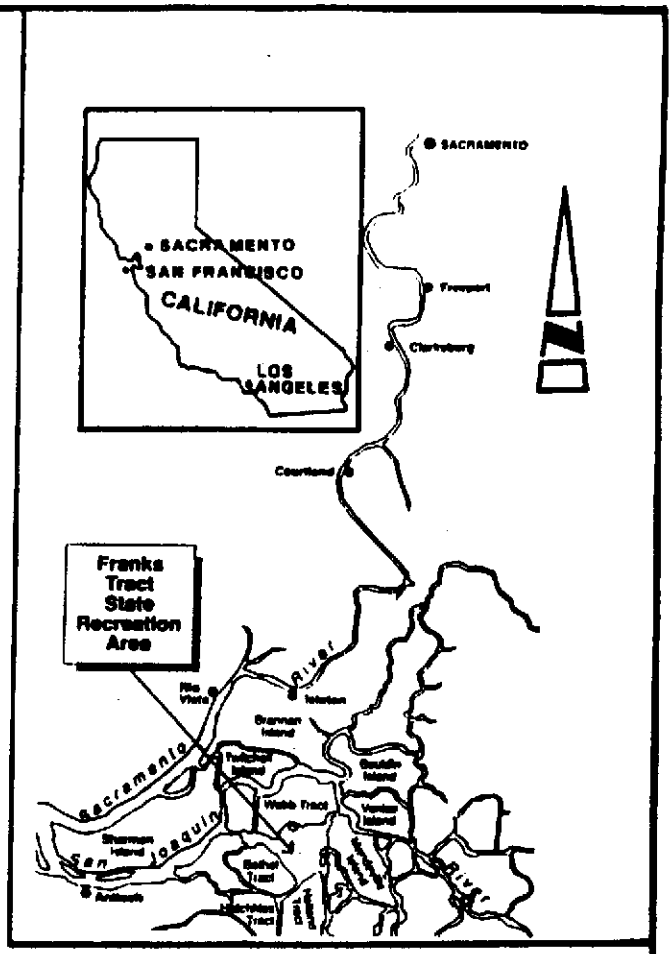
Islands III and IV maximizes the conversion of subtidal areas for recreational benefits. The crest elevation of the

fill will be -6' NGVD as shown in Figure 15.

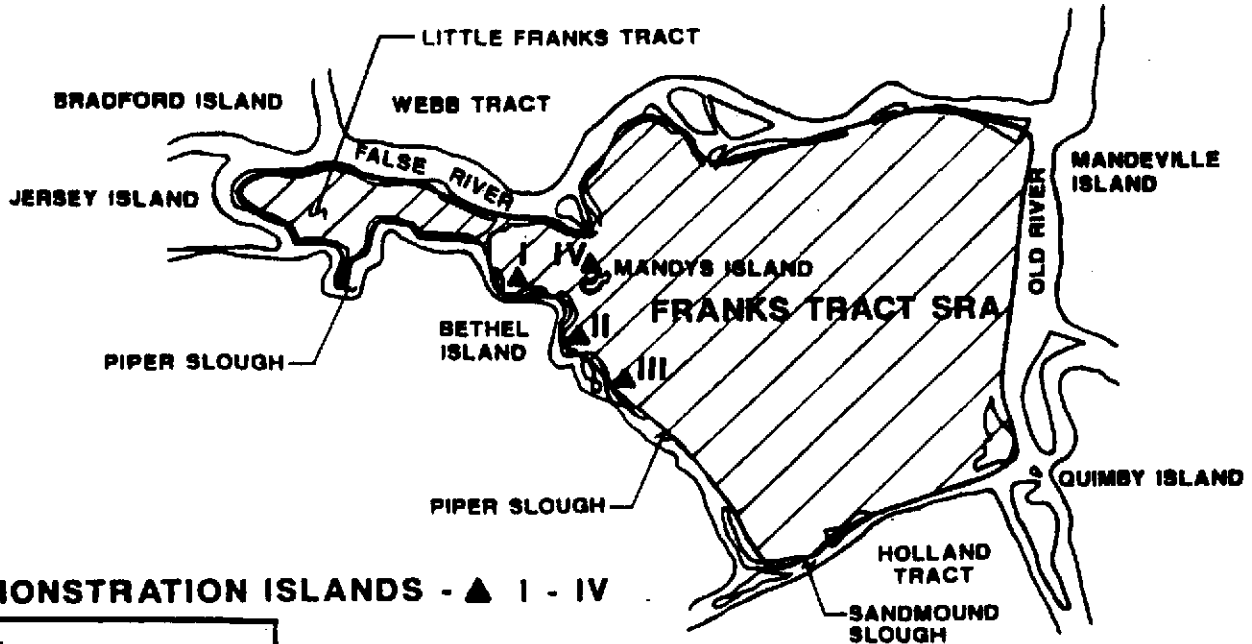
Materials for the island fills will be taken from relic sand mounds located in the central portion of Franks Tract. A total of about 1 million cubic yards of material in-place is estimated for construction of the island fills. Material will be removed by hydraulic dredge and placed in a series of lifts. Placement of the material will be controlled to minimize impacts on existing wetlands vegetation in the area, and on water quality. Control will also be necessary to help

Figure 11

STATE OF CALIFORNIA
DEPARTMENT OF PARKS & RECREATION



VICINITY MAP
NTS



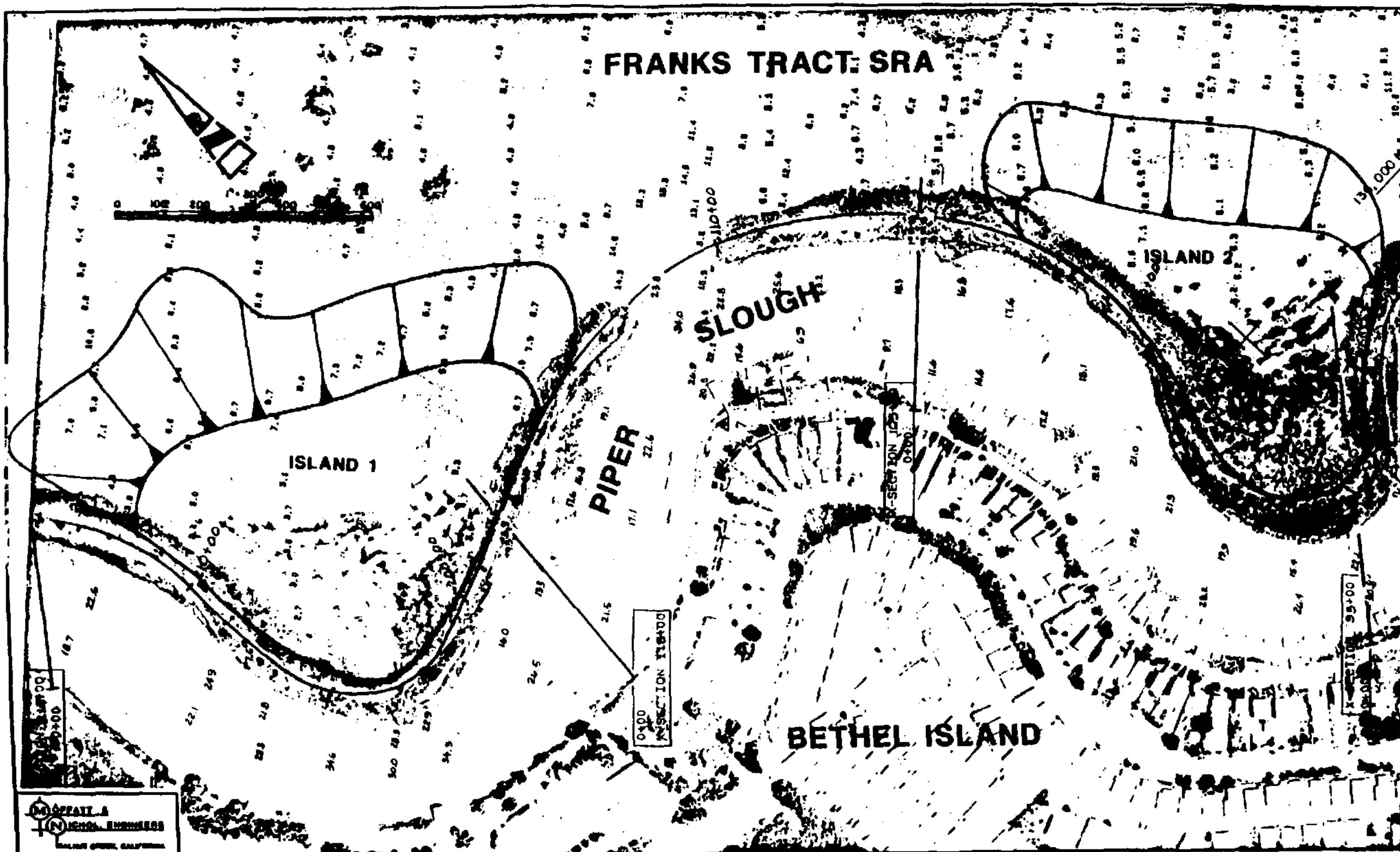
DEMONSTRATION ISLANDS - ▲ I - IV

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

LOCATION MAP
NTS

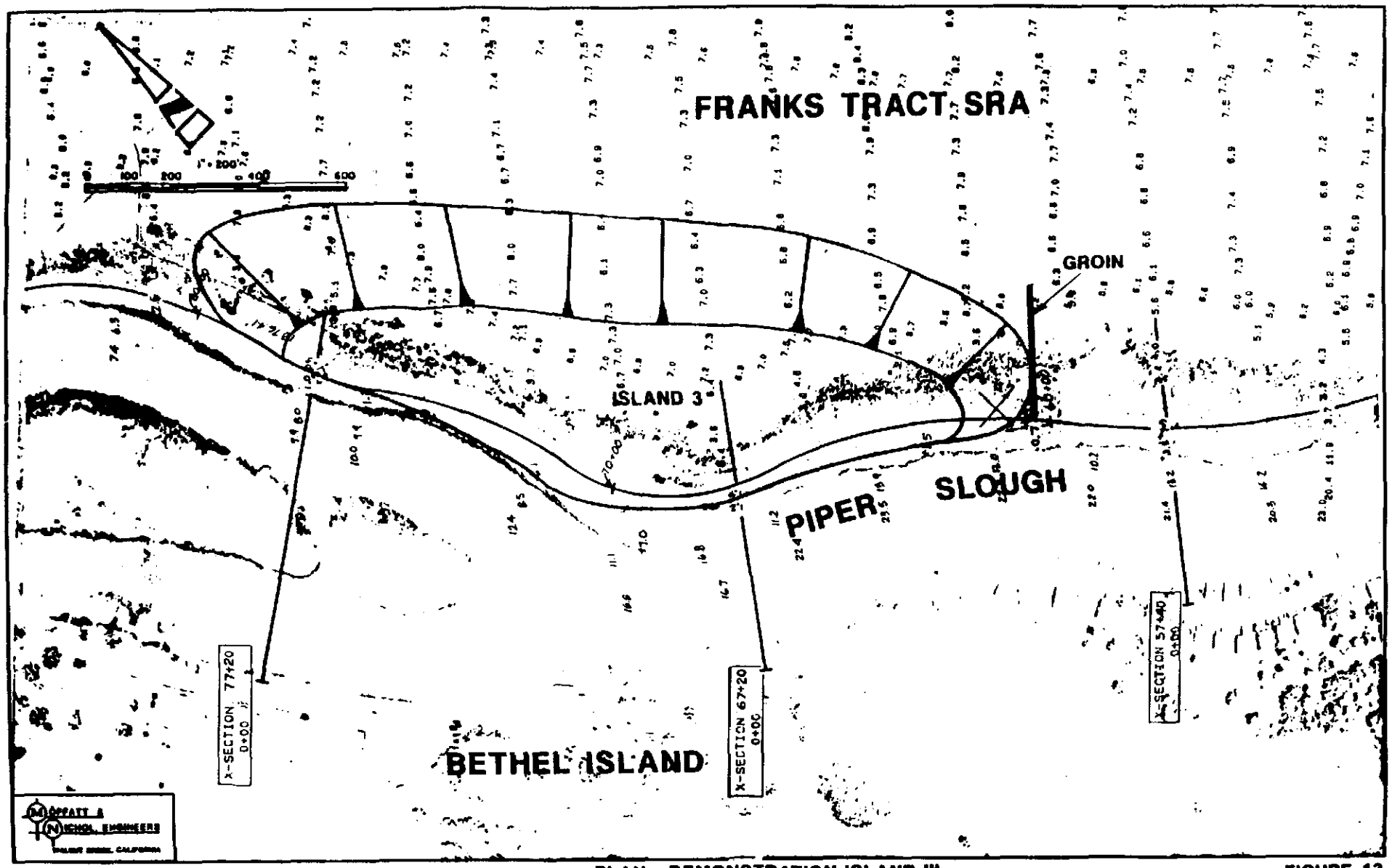
FIGURE 11

PROJECT LOCATION



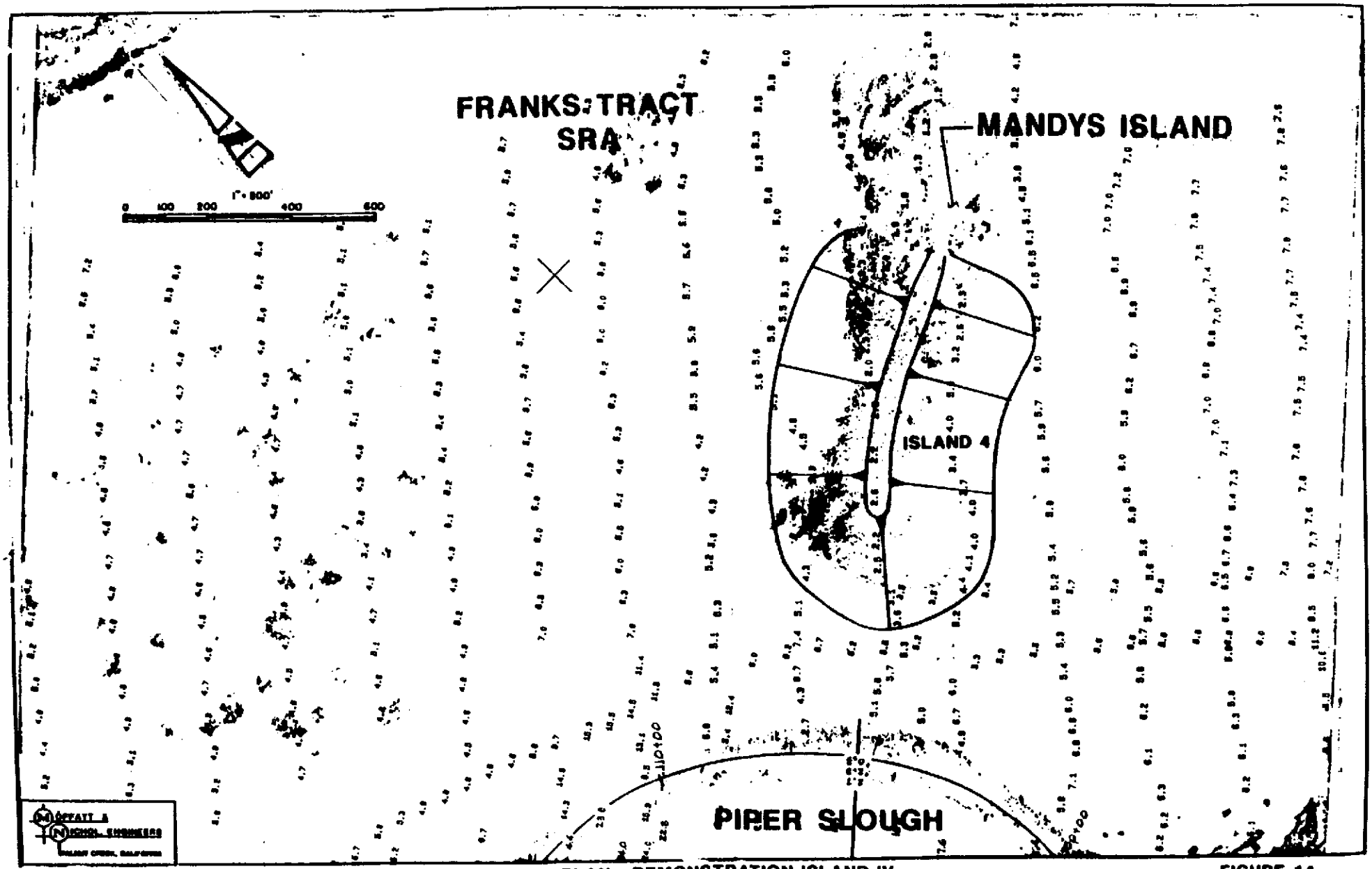
PLAN - DEMONSTRATION ISLANDS I & II

FIGURE 12



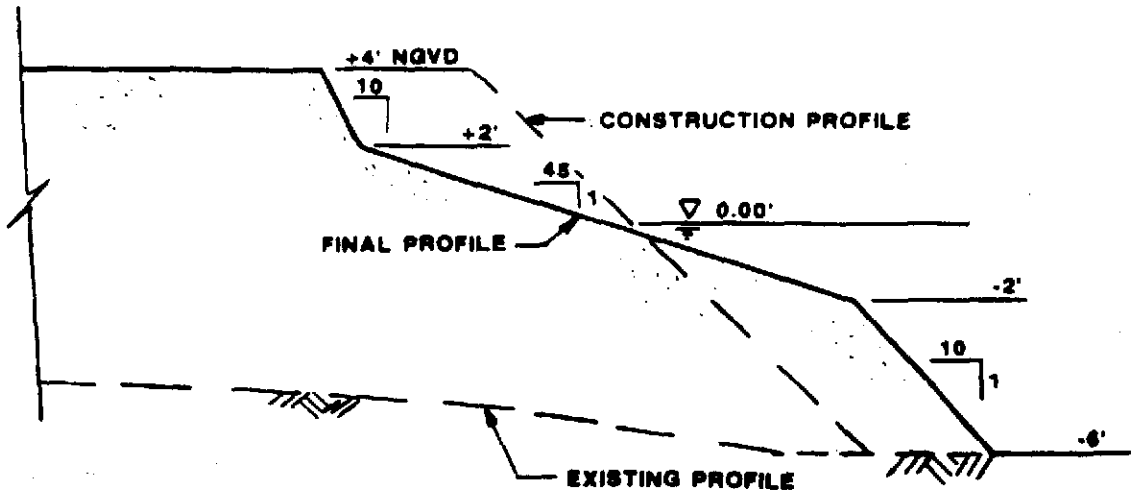
PLAN - DEMONSTRATION ISLAND III

FIGURE 13



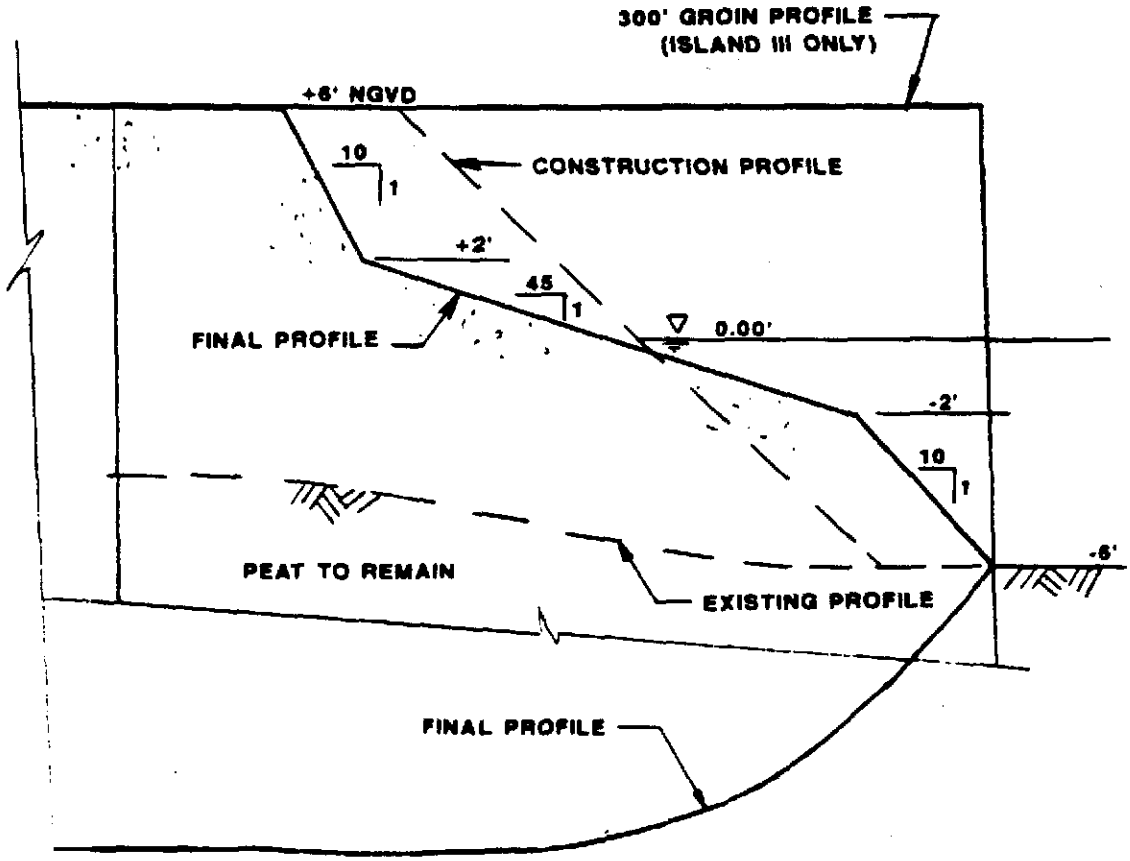
PLAN - DEMONSTRATION ISLAND IV

FIGURE 14



HABITAT AREA

NOTE: SAND PLACED ON EXISTING BOTTOM. NO REMOVAL OF PEAT.



RECREATION AREA

MOFFATT & NICHOL, ENGINEERS
WALNUT CREEK, CALIFORNIA

TYPICAL SECTIONS

FIGURE 15

insure stability of the remnant levee against which the fills will be placed, and proper blending of the fill with soft organic soils for vigorous plant growth.

Vegetation should propagate naturally on the islands in the shallow water areas; seeding and planting are proposed for the riparian areas. During the period of plant establishment, passive use of the recreational beaches can be permitted. As the vegetation matures, more intensive use may be permitted, including boat-in picnicking and camping.

As a demonstration project, monitoring should be performed following construction. Monitoring will determine the extent to which the anticipated project benefits have been realized, including wetlands creation and recreational utilization. Programs should include but not limited to monitoring of borrow site seepage, fill settlement/ consolidation, vegetation establishment.

C. COST ESTIMATE

The estimated cost of the proposed Demonstration project is $3.6 million. Table 6 presents a summary of the preliminary cost estimate. This cost is based on 1991 construction dollars, and includes overfill for subsidence and an allowance of 10% for losses of material during construction. It was assumed that an 8-inch dredge would be used and that the contractor would move out and back in between lifts. Project administration and engineering fees and an allowance for monitoring programs is included in the project cost estimate.

TABLE 6

BEACH FILLS
PRELIMINARY PROJECT COST ESTIMATE
(JANUARY 1991 $)

Item	Quantity	Unit	Unit Cost	Cost
Mobilization	1	Job	$100,000	$ 100,000
Dredge	969,600	cy	$3	2,908,800
Move Out/In	3	Moves	$ 25,000	75
Groin	300	lf	$ 1,000	300,000
Subtotal				$3,383,800
Project Administration & Engineering				120,000
Monitoring Programs				100,000
TOTAL PROJECT COST				**$3,603,800**

D. SCHEDULE

Implementation of the proposed demonstration project will require about 30 months. This schedule is based on a fast-track approach, where environmental certification and permit acquisition occur concurrently with final design and construction contract preparation during the first 12 months. Contract construction then follows over a period of about 18 months. This schedule does not include the

monitoring phase of the project, which begins immediately following construction and continues for a period of up to 5 years.

V. ENVIRONMENTAL REVIEW AND PERMIT PROCESS

The Franks Tract SRA Demonstration Project Review Process will involve public, state and local agencies and private groups and individuals. The project must comply with two environmental laws due to the involvement of both federal and state regulatory agencies: the State California Environmental Quality Act (CEQA) and the Federal National Environmental Policy Act (NEPA). A lead agency must be designated to insure compliance with the respective laws. The U.S. Army Corps of Engineers is expected to be the lead NEPA Agency and the California Department of Parks and Recreation will be the lead CEQA Agency. All groups may participate in the review process through this framework.

The National Environmental Policy Act (NEPA) was established in 1970 to require federal agencies to assess the environmental impacts of their proposed policies and actions through the preparation of Environmental Impact Statements (EIS). For NEPA, an Environmental Assessment is prepared to determine the significance of the impacts. If no significant impacts are determined, a Finding of No Significant Impact (FONSI) report is prepared. If significant impacts are determined, an EIS is prepared. California adopted a similar act for environmental protection. The act is called the California Environmental Quality Act (CEQA). It contains statements of legislative intent concerning state agency responsibilities for regulating activities so that consideration is given to preventing

environmental damage. An Initial Study is prepared by the lead agency to determine the significance of impacts for a project. If no significant impacts are determined, a Negative Declaration is prepared. If significant impacts are determined, an Environmental Impact Report (EIR) is prepared.

The jurisdictional limits of NEPA and CEQA are not well-defined. Projects in California are required to adhere to the CEQA guidelines for environmental impact assessment. For Franks Tract, Federal agencies will also be involved for permitting and review. A determination of federal involvement and the applicability of NEPA guidelines to the Franks Tract project should be made early in the environmental review process. This is necessary to define the scope of the documents that must be prepared. If NEPA guidelines apply, consideration should be given to joint document preparation that satisfies both Federal and State requirements.

The report "Franks Tract SRA - Permits, Priorities and Programs" (Moffatt & Nichol, Engineers, 1990) presents a listing of public and private entities with an interest in the project. The listing is divided into Federal, State and local agencies and public groups and individuals. The report describes the responsible agencies and the permits required, as well as the groups interest in the project and associated issues and comments. Table 7 is a listing of the primary permits required for the proposed project at Franks Tract SRA.

TABLE 7

PERMITS

Federal Agency	**State Agency**
U.S. Army Corps of Engineers	State Lands Commission

California Regional Water
Quality Control Board

VI. POTENTIAL FUNDING SOURCES

The project funding source is primarily from the Legislative Bond Act. The California Wildlife and Park Conservation Act (Proposition 70) includes up to $4 million to implement projects consistent with the Franks Tract SRA General Plan. These funds could apply to the proposed demonstration project.

As described in the long-term goals for the Delta Protection Act, projects that incorporate flood protection (wave protection) benefits can be considered eligible for monies from the Special Flood Control Projects program. In "Actions & Priorities, Delta Flood Protection Act" (Department of Water Resources, 1990), those Franks Tract State Recreation Area projects that provide wave protection to neighboring islands have been identified as possible cost-share projects. The demonstration project helps reinforce a portion of the remnant Franks Tract levees on Piper Slough and thereby provides protection for Bethel Island from waves generated on Franks Tract. This long term wave protection benefit is consistent with the Special Projects Program purpose. Continued communication with Department of Water Resources during environmental review, permit acquisition and final design phases will be needed. Although specific program design criteria do not exist, the projects will be evaluated for funding eligibility on the basis of benefits generated by the specific projects to be implemented at Franks Tract SRA.

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